BladeCenter HS22
Type 7870 and 1936

Installation and User's Guide

BladeCenter HS22
Type 7870 and 1936

Installation and User's Guide

Note: Before using this information and the product it supports, read the general information in "Notices" on page 79 and the *IBM Safety Information*, *IBM Systems Environmental Notices and User Guide*, *IBM Warranty and Support Information* documents on the IBM *Documentation* CD.

Ninth Edition (October 2010)

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information
(安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας
(safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

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Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się
z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Safety statements

These statements provide the caution and danger information used in this documentation.

Important:

Each caution and danger statement in this documentation is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled “Statement 1,” translations for that caution statement are in the *Safety Information* document under “Statement 1.”

Be sure to read all caution and danger statements in this documentation before you perform the procedures. Read any additional safety information that comes with your system or optional device before you install the device.

Statement 1

DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	**To Disconnect:**
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 2

CAUTION:
When replacing the lithium battery, use only IBM® Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

Statement 3

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Statement 8

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Statement 12

CAUTION:
The following label indicates a hot surface nearby.

Statement 13

DANGER

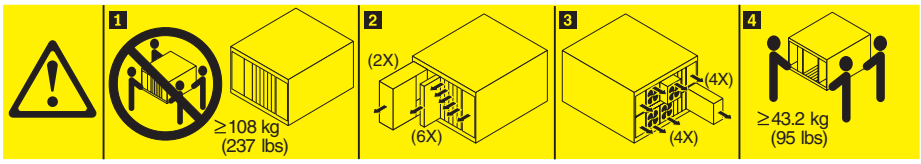
Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device for electrical specifications.

Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

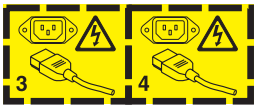
Statement 32

CAUTION:
To avoid personal injury, before lifting the unit, remove all the blades, power supplies, and removable modules to reduce the weight.



Statement 33

CAUTION:
This device does not provide a power control button. Removing power supply modules or turning off the server blades does not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



Rack Safety Information, Statement 2

DANGER

- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Always install the heaviest devices in the bottom of the rack cabinet.**

United Kingdom telecommunications safety requirement

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

Chapter 1. Introduction

The IBM BladeCenter® HS22 Type 7870 and Type 1936 blade server is compatible with IBM BladeCenter units. This high density, high performance, single-wide blade server is ideally suited for medium and large businesses. The IBM BladeCenter HS22 blade server supports up to two multi-core Intel Xeon microprocessors and has twelve memory-module slots, two hot-swappable storage-device bays, one Horizontal-compact-form-factor (CFFh) expansion card connector, one Vertical-combination-I/O (CIOv) connector, and one internal USB connector.

Note: Unless otherwise stated, references to the BladeCenter unit apply to all BladeCenter unit types.

This *Installation and User's Guide* provides information about:

- Setting up the blade server
- Starting and configuring the blade server
- Installing hardware options
- Installing the operating system
- Performing basic troubleshooting of the blade server

Packaged with this document are software CDs that help you to configure hardware, install device drivers, and install the operating system.

To download the latest device drivers, complete the following steps.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **BladeCenter**.
3. Under **Popular links**, click **Software and device drivers**.
4. Click **BladeCenter HS22** to display the matrix of downloadable files for the blade server.

The blade server comes with a limited warranty. For information about the terms of the warranty and getting service and assistance, see the *Warranty and Support Information* document for your blade server on the IBM *Documentation* CD. You can obtain up-to-date information about the blade server at http://www.ibm.com/systems/bladecenter/.

If firmware and documentation updates are available, you can download them from the IBM Web site. The blade server might have features that are not described in the documentation that comes with the blade server, and the documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the blade server documentation.

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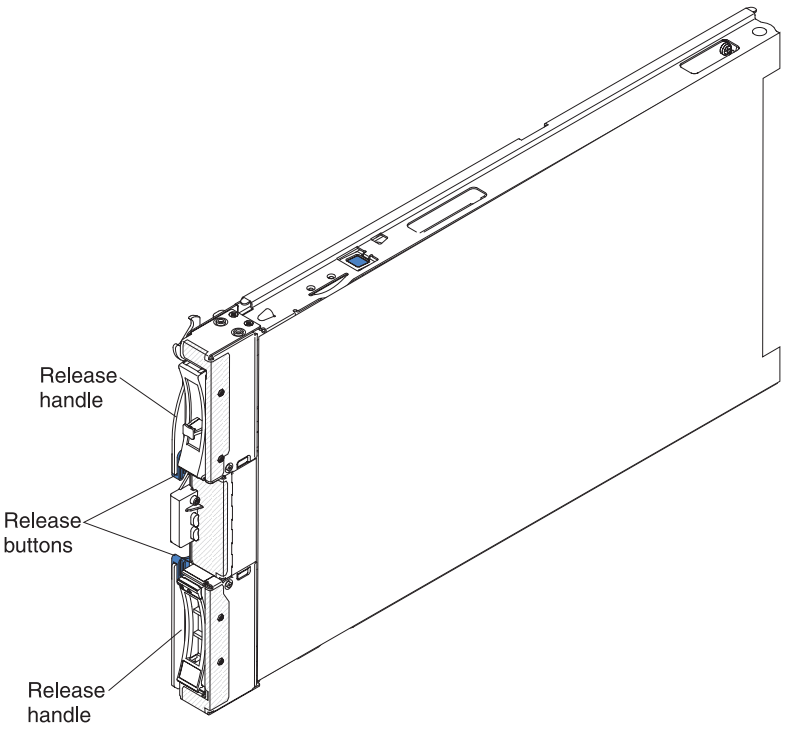
To check for updates, complete the following steps.

Note: Changes are made periodically to the IBM Web site. Procedures for locating firmware and documentation might change from what is described in this document.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **BladeCenter**.
3. Under **Popular links**, click **Software and device drivers** for firmware updates, or click **Publications lookup** for documentation updates.

You can subscribe to information updates specific to your blade server at http://www.ibm.com/support/mynotifications.

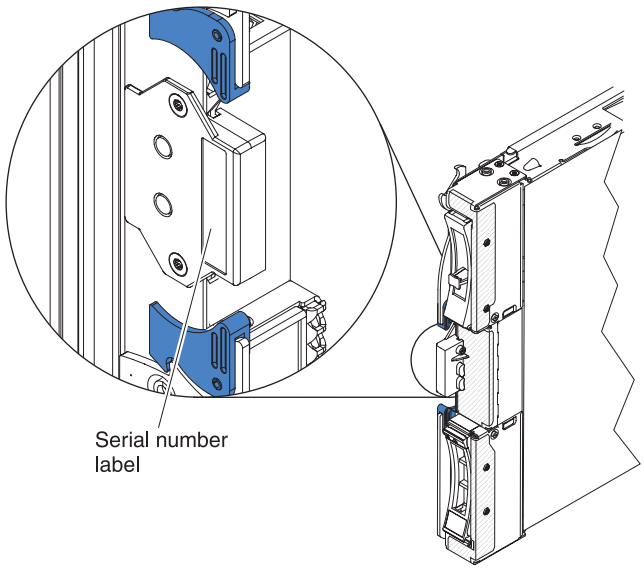
Note: The illustrations in this document might differ slightly from the hardware.



The model number and serial number are on the ID label on the side of the control panel on the front of the blade server, and on a label on the side of the blade server that is visible when the blade server is not in the BladeCenter unit.

Note: The illustrations in this document might differ slightly from the hardware.

Important: Do not place the label on the blade server itself or in any way block the ventilation holes on the blade server.



A set of blank labels for your blade server comes with the BladeCenter unit. When you install the blade server in the BladeCenter unit, write identifying information on a label and place the label on the BladeCenter unit bezel. See the documentation for your BladeCenter unit for recommended label placement.

Related documentation

Use this information to identify and locate related blade server documentation.

This *Installation and User's Guide* contains general information about the blade server, including how to install supported optional devices and how to configure the blade server. The following documentation also comes with the blade server:

- *Problem Determination and Service Guide*

  This document is in Portable Document Format (PDF) on the IBM *Documentation* CD. It contains information to help you solve problems yourself, and it contains information for service technicians.
- *Safety Information*

  This document is in PDF on the IBM *Documentation* CD. It contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* document.
- *Warranty and Support Information*

  This document is in PDF on the IBM *Documentation* CD. It contains information about the terms of the warranty and getting service and assistance.
- *Environmental Notices and User Guide*

  This document is in PDF on the IBM *Documentation* CD. It contains translated environmental notices.
- *Integrated Management Module User's Guide*

  This document is in PDF on the IBM Web site at http://www.ibm.com/systems/support/. This document explains how to use the functions of the IMM installed in an IBM server. The IMM works with IBM System x Server Firmware to provide systems-management capability for System x and BladeCenter servers.

- *Advanced Management Module Messages Guide*

  This document is in PDF on the IBM Web site at http://www.ibm.com/systems/support/. This document provides a complete list of all non-device specific events and recommended actions, sorted by event ID. Device specific event information is in the documentation for the device.

Depending on your BladeCenter product, additional documents might be included on the IBM *Documentation* CD. In addition to the documentation in this library, be sure to review the *Planning and Installation Guide* for your BladeCenter unit for information to help you prepare for system installation and configuration. To check for updated documentation and technical updates, complete the following steps.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **BladeCenter**.
3. Under **Popular links**, click **Publications lookup**.
4. From the **Product family** menu, select **BladeCenter HS22** .

The IBM Documentation CD

Use the IBM Documentation CD to access the blade server documentation in PDF format.

You can run the IBM *Documentation* CD on any personal computer that meets the hardware and software requirements.

The IBM *Documentation* CD contains documentation for your blade server in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

Hardware and software requirements

Use this information to determine the minimum hardware and software requirements for the blade server.

The IBM *Documentation* CD requires the following minimum hardware and software:

- Microsoft Windows XP, Windows 2000, or Red Hat Enterprise Linux 5 Server
- 100 MHz microprocessor
- 32 MB of RAM
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems

Using the Documentation Browser

Use these instructions to start the Documentation Browser.

Use the Documentation Browser to browse the contents of the CD, read brief descriptions of the documents, and view documents, using Adobe Acrobat Reader or xpdf. The Documentation Browser automatically detects the regional settings in use in your system and displays the documents in the language for that region (if available). If a document is not available in the language for that region, the English-language version is displayed.

Use one of the following procedures to start the Documentation Browser:

- If Autostart is enabled, insert the CD into the CD drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users, use one of the following procedures:
  - If you are using a Windows operating system, insert the CD into the CD or DVD drive and click **Start → Run**. In the **Open** field, type

    ```
    e:\win32.bat
    ```

    where *e* is the drive letter of the CD or DVD drive, and click **OK**.
  - If you are using Red Hat Linux, insert the CD into the CD or DVD drive; then, run the following command from the /mnt/cdrom directory:

    ```
    sh runlinux.sh
    ```

Select your blade server from the **Product** menu. The **Available Topics** list displays all the documents for your blade server. Some documents might be in folders. A plus sign (+) indicates each folder or document that has additional documents under it. Click the plus sign to display the additional documents.

When you select a document, a description of the document is displayed under **Topic Description**. To select more than one document, press and hold the Ctrl key while you select the documents. Click **View Book** to view the selected document or documents in Acrobat Reader or xpdf. If you selected more than one document, all the selected documents are opened in Acrobat Reader or xpdf.

To search all the documents, type a word or word string in the **Search** field and click **Search**. The documents in which the word or word string appears are listed in order of the most occurrences. Click a document to view it, and press Crtl+F to use the Acrobat search function, or press Alt+F to use the xpdf search function within the document.

Click **Help** for detailed information about using the Documentation Browser.

Notices and statements in this document

Use this information to understand the most common documentation notices and statements and how they are used.

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is on the IBM *Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate possible damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.

- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Features and specifications

Use this table to view specific information about the blade server, such as blade server hardware features and the dimensions of the blade server.

Notes:

1. Power, cooling, removable-media drives, external ports, and advanced system management are provided by the BladeCenter unit.
2. The operating system in the blade server must provide USB support for the blade server to recognize and use USB media drives and devices. The BladeCenter unit uses USB for internal communications with these devices.

The following table is a summary of the features and specifications of the blade server.

Table 1. Features and specifications

Microprocessor: Supports up to two multi-core Intel Xeon microprocessors. **Note:** Use the Setup utility to determine the type and speed of the microprocessors in the blade server.

Memory:
- 12 dual inline memory module (DIMM) connectors
- Type: Very Low Profile (VLP) double-data rate (DDR3) DRAM. Supports 1 GB, 2 GB, 4 GB, 8 GB, and 16 GB DIMMs with up to 192 GB of total memory on the system board

Integrated functions:
- Horizontal-compact-form-factor (CFFh) expansion card interface
- Vertical-combination-I/O (CIOv) expansion card interface
- Local service processor: Integrated Management Module (IMM) with Intelligent Platform Management Interface (IPMI) firmware
- Integrated Matrox G200eV video controller
- LSI 1064E SAS controller
- Broadcom BCM5709S dual-port Gigabit Ethernet controller
- Integrated keyboard/video/mouse (cKVM) controller through IMM
- Light path diagnostics
- RS-485 interface for communication with the management module
- Automatic server restart (ASR)
- USB 2.0 for communication with cKVM and removable media drives (an external USB port is not supported)
- Serial over LAN (SOL)
- Redundant buses for communication with keyboard, mouse, and removable media drives

Predictive Failure Analysis (PFA) alerts:
- Microprocessors
- Memory
- Storage drives

Electrical input: 12 V dc

Environment:
- Air temperature:
  - Blade server on: 10°C to 35°C (50°F to 95°F). Altitude: 0 m to 914.4 m (0 ft to 3000 ft)
  - Blade server on: 10°C to 32°C (50°F to 89.6°F). Altitude: 914.4 m to 2133.6 m (3000 ft to 7000 ft)
  - Blade server off: 10°C to 43°C (50°F to 109.4°F). Altitude: 914.4 m to 2133.6 m (3000 ft to 7000 ft)
  - Blade server shipping: -40°C to 60°C (-40°F to 140°F)
- Humidity:
  - Blade server on: 8% to 80%
  - Blade server off: 8% to 80%
  - Blade server storage: 5% to 80%
  - Blade server shipment: 5% to 100%
- Particulate contamination:

  Attention: Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see "Particulate contamination" on page 81.

Drives: Supports up to two hot-swap, small form factor (SFF) Serial Attached SCSI (SAS) or Serial ATA (SATA) storage drives

Size:
- Height: 24.5 cm (9.7 inches) (6U)
- Depth: 44.6 cm (17.6 inches)
- Width: 2.9 cm (1.14 inches)
- Maximum weight: 4.8 kg (10 lb)

NEBS Environment
- Air temperature:
  - Blade server on: 5°C to 40°C (41°F to 104°F). Altitude: -60 m to 1800 m (-197 ft to 6000 ft)
  - Blade server on: 5°C to 30°C (41°F to 86°F). Altitude: 1800 m to 4000 m (6000 ft to 13000 ft)
  - Blade server off: -5°C to 55°C (23°F to 131°F). Altitude: -60 m to 1800 m (-197 ft to 6000 ft)
  - Blade server off: -5°C to 45°C (23°F to 113°F). Altitude: 1800 m to 4000 m (6000 ft to 13000 ft)
  - Blade server storage: -40°C to 60°C (-40°F to 140°F)
- Humidity: 8% to 85%
- Particulate contamination:

  Attention: Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see "Particulate contamination" on page 81.

What your blade server offers

Your blade server offers features, such as, the Integrated Management Module, storage disk drive support, IBM® Director, IBM Enterprise X-Architecture®, microprocessor technology, integrated network support, I/O expansion, large system-memory capacity, light path diagnostics, PCI Express, and power throttling.

- **Integrated Management Module (IMM)**

  The Integrated Management Module (IMM) is on the system board of the blade server. The IMM operates as the service processor for the blade server and performs several tasks, including the following:

  - Provides RS-485 interfaces to the Advanced Management Module
  - I^2C compatible Two Wire interface
  - Local Environmental Monitoring
  - Local LED control
  - Automatic Server Restart (ASR)
  - One channel 16550 to support ready to send (RTS) and clear to send (CTS) modem control pins (two serial ports)
  - Serial over LAN (SOL)
  - Intelligent Platform Management Interface (IPMI) 2.0 compliant
  - Remote power on/power off of a remote blade server
  - Error logging
  - Remote systems management
  - Blade server oversubscription
  - Blower speed control
  - CPU throttling
  - Memory throttling
  - Integrated keyboard/video/mouse (cKVM)

- **Hard disk drive support**

  The blade server supports up to two 2.5-inch hot-swap SAS SFF hard disk drives, RAID 0 and RAID 1 support, up to 300 GB per drive.

- **IBM® Director**

  IBM Director is a workgroup-hardware-management tool that you can use to centrally manage servers. For more information, see the IBM® Director documentation on the *IBM® Director* CD.

- **IBM Enterprise X-Architecture**

  IBM Enterprise X-Architecture technology combines proven, innovative IBM designs to make your x86-processor-based blade server powerful, scalable, and reliable. For more information, see http://www.ibm.com/systems/x/hardware/enterprise/xarchitecture.html.

- **IBM *ServerGuide Setup and Installation* CD**

  The *ServerGuide Setup and Installation* CD provides programs to help you set up the blade server and install a Windows operating system. The ServerGuide program detects installed optional hardware devices and provides the correct configuration programs and device drivers. For more information about the *ServerGuide Setup and Installation* CD, see "Using the ServerGuide Setup and Installation CD" on page 59.

- **Integrated network support**

  All of the blade server models come with an integrated Broadcom dual-port Gigabit Ethernet controller. The controller supports connections to a 10 Mbps, 100 Mbps, or 1000 Mbps network through an Ethernet-compatible switch module in the BladeCenter unit. The controller also supports Wake on LAN® technology.

- **I/O expansion**

  The blade server has connectors on the system board for optional expansion cards for adding more network communication capabilities to the blade server.

- **Large system-memory capacity**

  The blade server system board supports up to 96 GB of system memory. The memory controller provides support for up to twelve industry-standard registered ECC DDR3 on Very Low Profile (VLP) form factor DIMMs installed on the system board. For the most current list of supported DIMMs, see the ServerProven® list at http://www.ibm.com/servers/eserver/serverproven/compat/us/.

- **Light path diagnostics**

  Light path diagnostics provides light-emitting diodes (LEDs) to help you diagnose problems. For more information, see the *Problem Determination and Service Guide*.

- **PCI Express**

  PCI Express is a serial interface that is used for chip-to-chip interconnect and expansion adapter interconnect. With the blade expansion connector you can add optional I/O and storage devices.

- **Power throttling**

  Each blade server is powered by two Enterprise Voltage Regulator-Down (EVRD) 11.0 voltage regulators. By enforcing a power policy known as power-domain oversubscription, the BladeCenter unit can share the power load between two power modules to ensure sufficient power for each device in the BladeCenter unit. This policy is enforced when the initial power is applied to the BladeCenter unit or when a blade server is inserted into the BladeCenter unit.

  The following settings for this policy are available:

  – Redundant without performance impact
  – Redundant with performance impact
  – Nonredundant

  You can configure and monitor the power environment by using the Advanced Management Module. For more information about configuring and using power throttling, see the Advanced-Management-Module documentation or http://www.ibm.com/systems/support/.

Reliability, availability, and serviceability features

Reliability, availability, and serviceability features help to ensure the integrity of the data that is stored in the blade server, the availability of the blade server when you need it, and the ease with which you can diagnose and correct problems.

Three of the most important features in server design are reliability, availability, and serviceability (RAS). These RAS features help to ensure the integrity of the data that is stored in the blade server, the availability of the blade server when you need it, and the ease with which you can diagnose and correct problems.

The blade server has the following RAS features:

- Customer upgrade of Flash ROM-resident code and diagnostics
- Power Policy 24-hour support center
- VPD on Memory
- Processor presence detect
- Advanced Configuration and Power Interface (ACPI)
- Automatic server restart (ASR)
- Built-in monitoring for temperature, voltage, and hard disk drives
- Customer support center 24 hours per day, 7 days a week.[1]
- Customer-upgradeable Unified Extensible Firmware Interface (UEFI) code and diagnostics
- Diagnostic support of Ethernet controllers
- ECC protection on the L2 cache
- Error codes and messages
- Hot-swap SAS storage drives
- Integrated Management Module (IMM)
- Light path diagnostics feature
- Memory parity testing
- Registered ECC DDR3 memory
- Microprocessor built-in self-test (BIST) during power-on self-test (POST)
- Microprocessor serial number access
- PCI PMI 2.2
- PCI Express 1.0a
- POST
- ROM resident diagnostics
- Service processor that communicates with the Advanced Management Module to enable remote blade server management
- System error logging
- Wake on LAN capability
- Wake on PCI (PME) capability
- Wake on USB 2.0 capability

1. Service availability will vary by country. Response time will vary depending on the number and nature of incoming calls.

IBM® Director

Use this information to understand how IBM® Director works with the blade server.

With IBM® Director, a network administrator can perform the following tasks:

- View the hardware configuration of remote systems, in detail
- Monitor the usage and performance of critical components, such as microprocessors, disks, and memory
- Centrally manage individual or large groups of IBM and non-IBM x86-processor-based servers, desktop computers, workstations, and notebook computers on a variety of platforms

IBM® Director provides a comprehensive entry-level workgroup hardware manager. It includes the following key features:

- Advanced self-management capabilities for maximum system availability.
- Multiple operating-system platform support, including Microsoft Small Business Server, Microsoft Windows 2000 Server, Windows Server 2003, AIX®, i5/OS®, Red Hat Linux, SUSE Linux, and VMware. For a complete list of operating systems that support IBM Director, see the IBM Director Compatibility Document. This document is in Portable Document Format (PDF) at http://www.ibm.com/systems/management/director/resources/. It is updated every 6 to 8 weeks.
- Support for IBM and non-IBM servers, desktop computers, workstations, and notebook computers.
- Support for systems-management industry standards.
- Integration into leading workgroup and enterprise systems-management environments.
- Ease of use, training, and setup.

IBM® Director also provides an extensible platform that supports advanced server tools that are designed to reduce the total cost of managing and supporting networked systems. By deploying IBM® Director, you can achieve reductions in ownership costs through the following benefits:

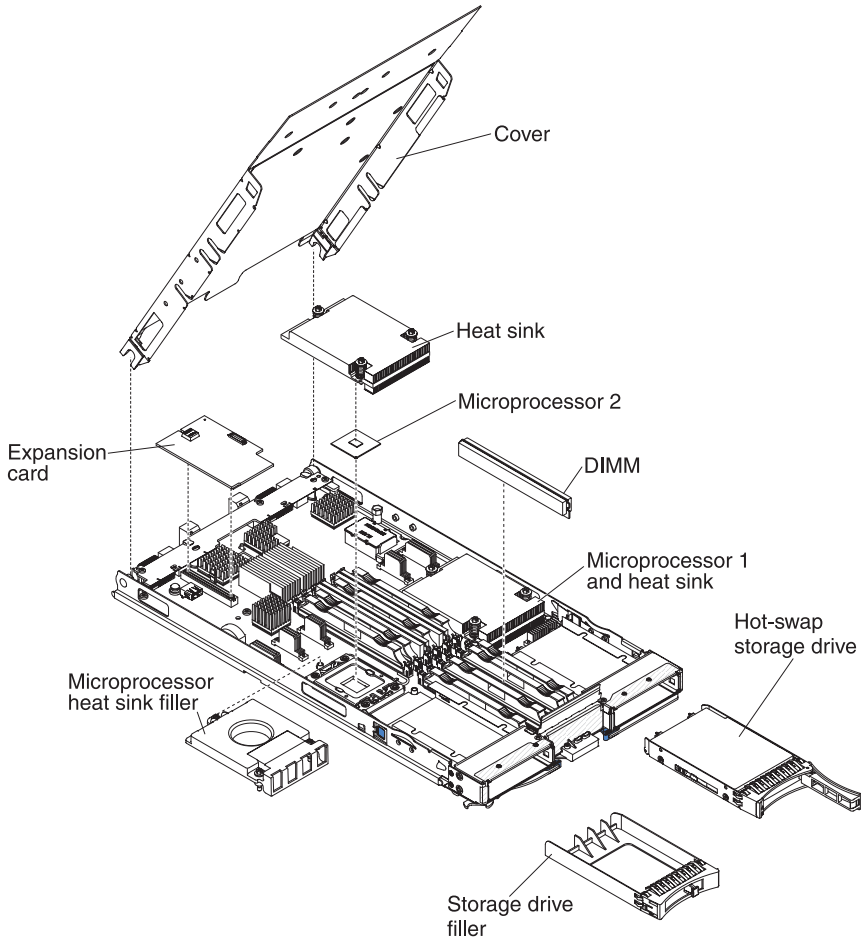
- Reduced downtime
- Increased productivity of IT personnel and users
- Reduced service and support costs

For more information about IBM® Director, see the documentation on the *IBM® Director* CD that comes with the server, the IBM® Director Information Center at http://publib.boulder.ibm.com/infocenter/eserver/v1r2/topic/diricinfo_all/diricinfoparent.html and the IBM xSeries® Systems Management Web page at http://www.ibm.com/servers/eserver/xseries/systems_management/, which presents an overview of IBM Systems Management and IBM® Director.

Major components of the blade server

Use this information to locate the major components on the blade server. The major components of the blade server include Field Replaceable Units (FRUs), Customer Replaceable Units (CRUs), and optional devices.

The following illustration shows the major components of the blade server.



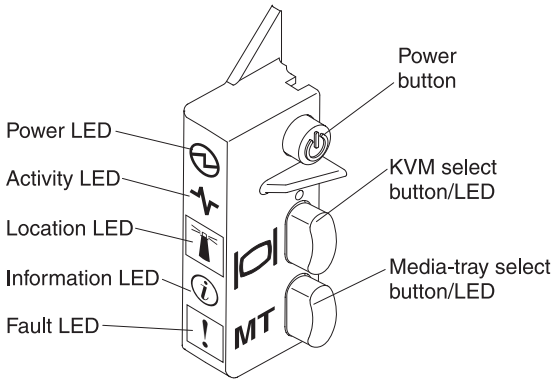
Chapter 2. Power, controls, and indicators

Use this information to view power features, turn on and turn off the blade server, and view the functions of the controls and indicators.

Blade server controls and LEDs

Use this information for details about the controls and LEDs on the blade server.

The following illustration identifies the buttons and information LEDs on the blade-server control panel.



Power-on LED: This green LED indicates the power status of the blade server in the following manner:

- Flashing rapidly: While the service processor in the blade server is initializing and synchronizing with the management module, the power-on LED flashes rapidly, and the power-control button on the blade server does not respond. This process can take approximately two minutes after the blade server has been installed. If the LED continues to flash rapidly, the blade server might not have power permissions assigned to it through the Advanced Management Module, the BladeCenter unit does not have enough power to turn on the blade server, or the service processor (IMM) on the blade server is not communicating with the Advanced Management Module.
- Flashing slowly: The blade server has power supplied and is ready to be turned on.
- Lit continuously: The blade server has power and is turned on.

Activity LED: When this green LED is lit, it indicates that there is activity on the external storage device or network.

Location LED: The system administrator can remotely turn on this blue LED to aid in visually locating the blade server. When this LED is lit, the location LED on the BladeCenter unit is also lit. The location LED can be turned off through the Advanced-Management-Module Web interface or through IBM® Director Console. For more information about the Advanced-Management-Module Web interface, see http://www.ibm.com/systems/management/. For more information about IBM® Director, see the documentation on the IBM® Director CD that comes with the

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server, or visit the IBM® Director Information Center at http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp.

Information LED: When this amber LED is lit, it indicates that information about a system event in the blade server has been placed in the Advanced-Management-Module event log. The information LED can be turned off through the Advanced-Management-Module CLI, SNMP, or Web interface or through IBM® Director Console. For more information about the Advanced-Management-Module Web interface, see http://www.ibm.com/systems/management/. For more information about IBM® Director, see the documentation on the IBM® Director CD that comes with the server, or visit the IBM® Director Information Center at http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp.

Fault LED: When this amber LED is lit, it indicates that a system error has occurred in the blade server. The blade-error LED turns off only after the error is corrected.

Power-control button: Press this button to turn on or turn off the blade server.

Note: The power-control button has effect only if local power control is enabled for the blade server. Local power control is enabled and disabled through the Advanced-Management-Module Web interface.

Keyboard/video/mouse (KVM) select button: Press this button to associate the shared BladeCenter unit keyboard port, video port, and mouse port with the blade server. The LED on this button flashes while the request is being processed and then is lit when the ownership of the keyboard, video, and mouse has been transferred to the blade server. It can take approximately 20 seconds to switch the keyboard, video, and mouse control to the blade server.

Using a keyboard that is directly attached to the Advanced-Management-Module, you can press keyboard keys in the following sequence to switch KVM control between blade servers instead of using the KVM select button:

NumLock NumLock *blade_server_number* Enter

blade_server_number is the two-digit number of the blade-server bay in which the blade server is installed. A blade server that occupies more than one blade-server bay is identified by the lowest bay number that it occupies.

If there is no response when you press the KVM select button, you can use the Advanced-Management-Module Web interface to determine whether local control has been disabled on the blade server. See http://www.ibm.com/systems/management/ for more information.

Notes:

1. The operating system in the blade server must provide USB support for the blade server to recognize and use the keyboard and mouse, even if the keyboard and mouse have PS/2-style connectors.
2. If you install a supported Microsoft Windows operating system on the blade server while it is not the current owner of the keyboard, video, and mouse, a delay of up to 1 minute occurs the first time that you switch the keyboard, video, and mouse to the blade server. All subsequent switching takes place in the normal KVM switching time frame (up to 20 seconds).

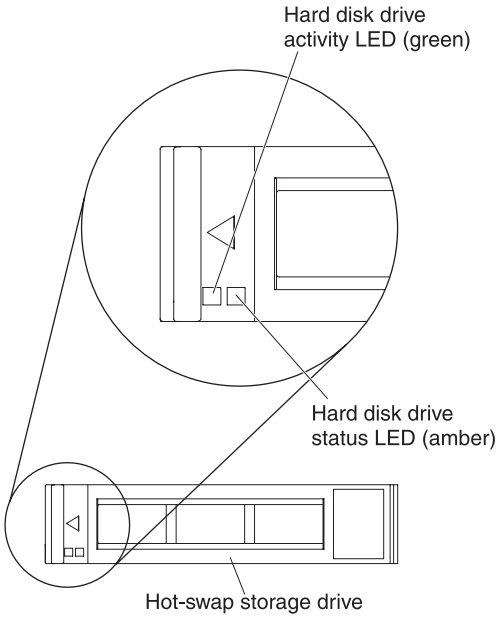
Media-tray select button: Press this button to associate the shared BladeCenter unit media tray (removable-media drives) with the blade server. The LED on the

button flashes while the request is being processed and then is lit when the ownership of the media tray has been transferred to the blade server. It can take approximately 20 seconds for the operating system in the blade server to recognize the media tray.

If there is no response when you press the media-tray select button, you can use the Advanced-Management-Module Web interface to determine whether local control has been disabled on the blade server.

Note: The operating system in the blade server must provide USB support for the blade server to recognize and use the removable-media drives.

The following illustration identifies the information LEDs on the SAS hot-swap hard disk drive.



Hard disk drive activity LED (green): When this green LED is lit, it indicates that there is activity on the storage drive.

Hard disk drive status LED (amber): When this amber LED is lit, it indicates that an error has occurred with the storage drive. The LED turns off only after the error is corrected.

Turning on the blade server

Use this information to turn on the blade server.

After you connect the blade server to power through the BladeCenter unit, the blade server can start in any of the following ways:

- You can press the power-control button on the front of the blade server (see "Blade server controls and LEDs" on page 15) to start the blade server.

  Notes:

  1. Wait until the power-on LED on the blade server flashes slowly before you press the power-control button. While the service processor in the blade server is initializing and synchronizing with the management module, the power-on LED flashes rapidly, and the power-control button on the blade server does not respond. This process can take approximately two minutes after the blade server has been installed.
  2. While the blade server is starting, the power-on LED on the front of the blade server is lit and does not flash. See "Blade server controls and LEDs" on page 15 for the power-on LED states.
- If a power failure occurs, the BladeCenter unit and the blade server can be configured to start automatically when power is restored through the Advanced Management Module.
- You can turn on the blade server remotely by using the management module.
- If the blade server is connected to power (the power-on LED is flashing slowly), the blade server is communicating with the management module, the operating system supports the Wake on LAN feature, and the Wake on LAN feature has not been disabled through the management module, the Wake on LAN feature can turn on the blade server.

Turning off the blade server

Use this information to turn off the blade server.

When you turn off the blade server, it is still connected to power through the BladeCenter unit. The blade server can respond to requests from the service processor, such as a remote request to turn on the blade server. To remove all power from the blade server, you must remove it from the BladeCenter unit. Shut down the operating system before you turn off the blade server. See the operating-system documentation for information about shutting down the operating system.

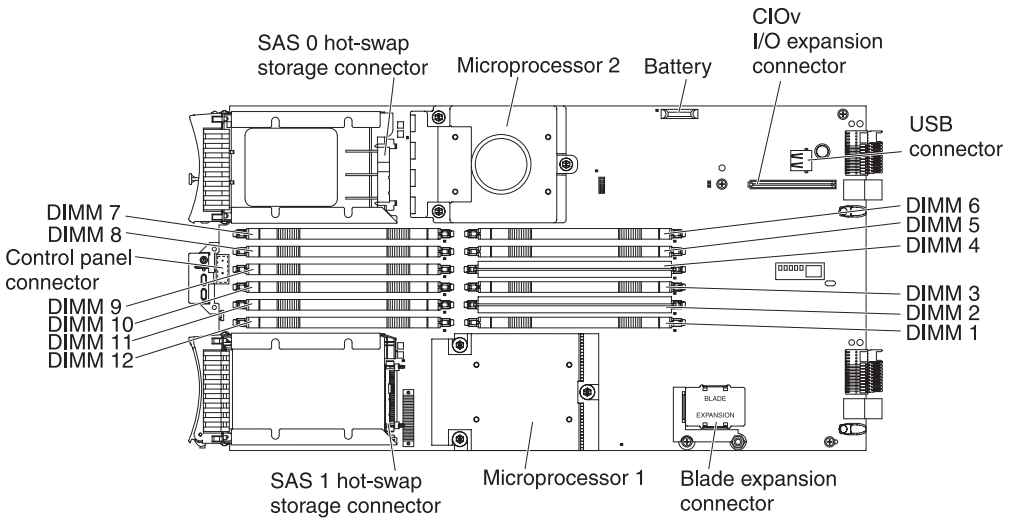
The blade server can be turned off in any of the following ways:

- You can press the power-control button on the blade server (see "Blade server controls and LEDs" on page 15). This starts an orderly shutdown of the operating system, if this feature is supported by the operating system.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the blade server.
- The management module can turn off the blade server through the Advanced-Management-Module Web interface. For additional information, see the *IBM BladeCenter Management Module User's Guide* or go to http://www-03.ibm.com/systems/management/ for more information.

Blade server connectors

Use this information to locate blade server system-board components and connectors for optional devices.

The following illustration shows the system-board components, including connectors for user-installable optional devices, in the blade server.



Chapter 3. Installing options

Use this information for instructions about installing optional hardware devices in the blade server. Some option-removal instructions are provided in case you have to remove one option to install another.

Installation guidelines

Use these guidelines before you install the blade server or optional devices.

Before you install optional devices, read the following information:

- Before you begin, read "Safety" on page v and "Handling static-sensitive devices" on page 22. This information will help you work safely.
- When you install your new blade server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your blade server is ready to function at maximum levels of performance.

  To download firmware updates for your blade server, complete the following steps.

  Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

  1. Go to http://www.ibm.com/systems/support/.
  2. Under **Product support**, click **BladeCenter**.
  3. Under **Popular links**, click **Software and device drivers**.
  4. Click **BladeCenter HS22** to display the matrix of downloadable files for the blade server.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- Back up all important data before you make changes to disk drives.
- Before you remove a blade server from the BladeCenter unit, you must shut down the operating system and turn off the blade server. You do not have to shut down the BladeCenter unit itself.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the blade server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- For a list of supported optional devices for the blade server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

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System reliability guidelines

Use this information to make sure that the blade server meets the proper cooling and reliability guidelines.

To help make sure that proper cooling and system reliability requirements are met, review the following guidelines:

- To ensure proper cooling, do not operate the BladeCenter unit without a blade server, expansion unit, or blade filler installed in each blade-server bay. See the documentation for your BladeCenter unit for additional information.
- Each microprocessor socket always contains either a microprocessor dust cover and heat sink filler or a microprocessor and heat sink. If the blade server has only one microprocessor, it must be installed in microprocessor socket 1.
- Each DIMM socket always contains a memory module or filler.
- Each hot-swap SAS bay contains a SAS storage drive or filler.
- Make sure that the ventilation holes on the blade server are not blocked.
- The blade server battery must be operational. If the battery becomes defective, replace it immediately. For instructions, see the *Problem Determination and Service Guide*.

Handling static-sensitive devices

Use this information to observe the static-sensitive device requirements.

Attention: Static electricity can damage the blade server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

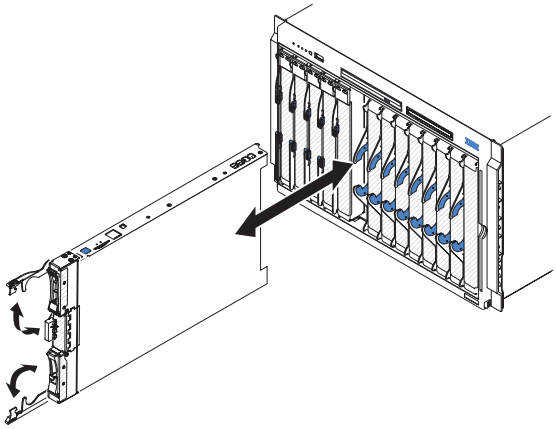
To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

- When you work on a BladeCenter unit that has an electrostatic discharge (ESD) connector, use a wrist strap, especially when you handle modules, optional devices, or blade servers. To work correctly, the wrist strap must have a good contact at both ends (touching your skin at one end and firmly connected to the ESD connector on the front or back of the BladeCenter unit).
- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an *unpainted* metal part of the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component in the rack in which you are installing the device for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the blade server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the blade server cover or on a metal surface.
- Take additional care when you handle devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Removing the blade server from the BladeCenter unit

Use these instructions to remove the blade server from the BladeCenter unit.

The following illustration shows how to remove a single-width type of blade server or blade filler from a Type 8677 BladeCenter unit. The appearance of your BladeCenter unit might be different; see the documentation for your BladeCenter unit for additional information.



Attention:

- To maintain proper system cooling, do not operate the BladeCenter unit without a blade server, expansion unit, or filler module installed in each blade server bay.
- When you remove the blade server, note the blade-server bay number. Reinstalling a blade server into a different blade server bay from the one it was removed from can have unintended consequences. Some configuration information and update options are established according to blade-server bay number; if you reinstall the blade server into a different bay, you might have to reconfigure the blade server.

To remove the blade server, complete the following steps:

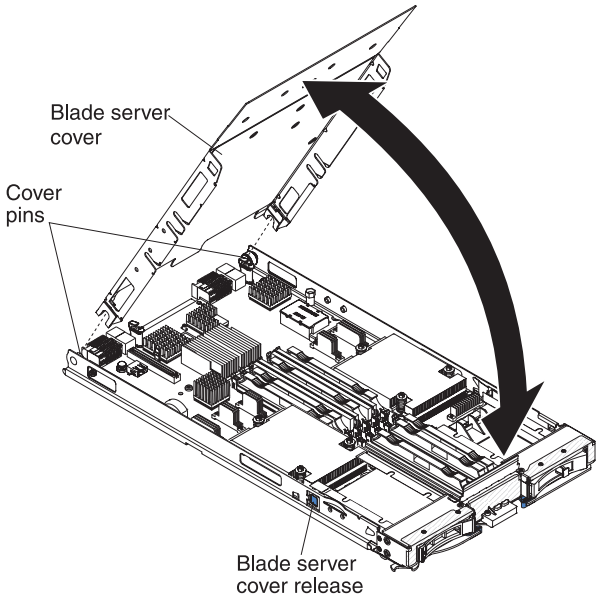
1. If the blade server is operating, shut down the operating system (see the documentation for your operating system for more information).
2. If the server is still on, press the power-control button for four seconds to turn off the blade server (see "Turning off the blade server" on page 18 for more information).

   Attention: Wait at least 30 seconds, until the storage devices stops spinning, before you proceed to the next step.
3. Open the two release handles as shown in the illustration. The blade server moves out of the blade server bay approximately 0.6 cm (0.25 inch).
4. Pull the blade server out of the bay.
5. Place either a blade filler or another blade server in the blade server bay within 1 minute.

Removing the blade server cover

Use these instructions to open the blade server cover.

The following illustration shows how to open the cover on the blade server.



To open the blade server cover, complete the following steps.

1. Before you begin, read “Safety” on page v and “Installation guidelines” on page 21.
2. If the blade server is installed in a BladeCenter unit, remove it (see “Removing the blade server from the BladeCenter unit” on page 23 for instructions).
3. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
4. Press the blade server cover release on each side of the blade server or expansion unit and lift the cover open, as shown in the illustration.
5. Lay the cover flat, or lift it from the blade server and store for future use.

Statement 21

CAUTION:
Hazardous energy is present when the blade server is connected to the power source. Always replace the blade cover before installing the blade server.

Installing an optional expansion unit

Use these instructions to install an optional expansion unit.

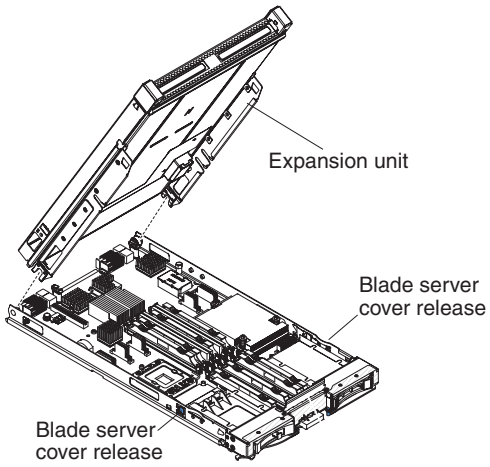
The optional expansion units supported for this blade server are the PCI Express I/O expansion unit.

Attention: If a horizontal combination-form-factor (CFFh) expansion card is installed on the blade server system board, you cannot install an optional expansion unit.

Notes:

1. The following illustration shows an optional expansion unit in a blade server.
2. The illustrations in this document might differ slightly from your hardware.

To install an optional expansion unit, complete the following steps.

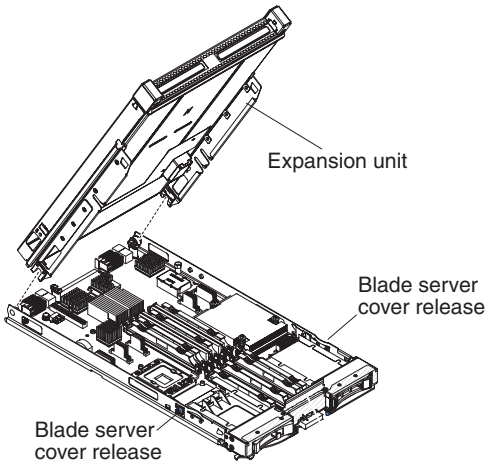


1. Before you begin, read “Safety” on page v and “Installation guidelines” on page 21.
2. If the blade server is installed in a BladeCenter unit, remove it (see “Removing the blade server from the BladeCenter unit” on page 23 for instructions).
3. Remove the blade server cover (see “Removing the blade server cover” on page 24).
4. Locate the blade expansion connector and remove the cover if one is installed (see “Blade server connectors” on page 19).
5. Touch the static-protective package that contains the optional expansion unit to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the optional expansion unit from the package.
6. Orient the optional expansion unit as shown in the illustration.
7. Lower the expansion unit so that the slots at the rear slide down onto the cover pins at the rear of the blade server; then, pivot the expansion unit down onto the blade server.
8. If the expansion unit has an extraction device (such as a thumbscrew or a lever), use it to fully engage the expansion unit on the blade server; otherwise, press the expansion unit firmly into the closed position until it clicks into place.
9. If you have other devices to install or remove, do so now; otherwise, go to “Completing the installation” on page 49.

Removing an optional expansion unit

Use these instructions to remove the optional expansion unit from the blade server.

To remove an optional expansion unit, complete the following steps:



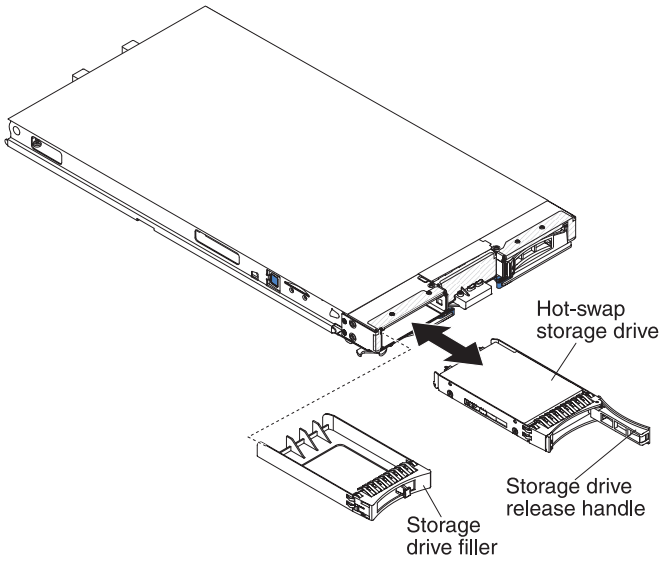
1. Before you begin, read “Safety” on page v and “Installation guidelines” on page 21.
2. If the blade server is installed in a BladeCenter unit, remove it (see “Removing the blade server from the BladeCenter unit” on page 23 for instructions).
3. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
4. Remove the blade server cover, if one is installed (see “Removing the blade server cover” on page 24 for instructions).
5. Remove the expansion unit:
   a. If the expansion unit has an extraction device, use the extraction device to disengage the expansion unit from the blade server. These extraction devices can be of several types, including thumbscrews or levers.
   b. If the expansion unit does not have an extraction device, press the blade server cover release on each side of the blade server and lift the expansion unit from the blade server.
   c. Rotate the expansion unit open; then, lift the expansion unit from the blade server.
6. If you are instructed to return the expansion unit, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a hot-swap storage drive

Use these instructions to install a hot-swap storage drive into the blade server.

The blade server has two SAS storage bays for installing hot-swap storage drives, such as a hot-swap SAS hard disk drive. One storage drive might already be installed in the blade server in storage bay 0. If the blade server is equipped with one storage drive, you can install an additional drive in storage bay 1. The blade server supports using RAID 0 or RAID 1 when two storage drives of the same interface type are installed. See "Configuring a RAID array" on page 63 for information about SAS RAID configuration.

To install a hot-swap storage drive or drive filler, complete the following steps.



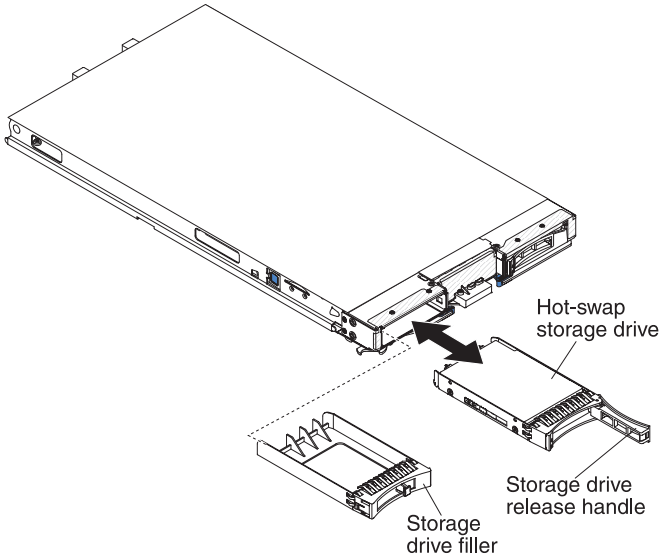
1. Before you begin, read "Safety" on page v and "Installation guidelines" on page 21.
2. Identify the SAS storage bay (storage bay 0 or storage bay 1) in which the hot-swap storage drive will be installed (see "Blade server connectors" on page 19).
3. If a storage-bay filler is installed, remove it from the blade server by pulling the release lever and sliding the filler away from the blade server (see "Removing a hot-swap storage drive" on page 28).
4. Touch the static-protective package that contains the hot-swap storage drive to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the hard disk drive from the package.
5. Open the release lever on the hot-swap storage drive and slide the drive into the storage bay until it is firmly seated in the connector.
6. Lock the hot-swap storage drive into place by closing the release lever.

If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 49.

Removing a hot-swap storage drive

Use this information to remove a hot-swap storage drive.

The blade server has two SAS hot-swap storage bays for installing or removing hot-swap storage devices, such as a SAS storage drive. To remove a hot-swap hard disk drive or drive filler, complete the following steps.



1. Before you begin, read “Safety” on page v and “Installation guidelines” on page 21.
2. Press the release latch (orange) on the storage drive to release the drive handle.
3. Pull the release handle to remove the drive from the storage bay.

Installing a memory module

Use these instructions to install memory modules in the blade server.

The blade server has a total of twelve direct inline memory module (DIMM) slots. The blade server supports very low profile (VLP) DDR3 DIMMs with error code correction (ECC) in 1 GB, 2 GB, 4 GB, 8 GB, and 16 GB capacities. For a current list of supported DIMMs for the blade server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

After you install or remove a DIMM, you must change and save the new configuration information by using the Setup utility. When you turn on the blade server, a message indicates that the memory configuration has changed. Start the Setup utility and select **Save Settings** (see "Setup utility menu" on page 56 for more information) to save changes.

The memory is accessed internally through the system using six channels. Each channel contains two DIMM connectors. The following table lists each channel and which DIMM connectors belong to the channel.

Table 2. Memory channel configuration

Memory channel	**DIMM connector**
Channel 0	DIMM connector 1 and 2
Channel 1	DIMM connector 5 and 6
Channel 2	DIMM connector 3 and 4
Channel 3	DIMM connector 7 and 8
Channel 4	DIMM connector 11 and 12
Channel 5	DIMM connector 9 and 10

Depending on the memory mode that is set in the Setup utility, the blade server can support a minimum of 1 GB and a maximum of 48 GB of system memory on the system board in a blade server with one processor. If two microprocessors are installed, the blade server can support a minimum of 2 GB and a maximum of 96 GB of system memory. There are two different memory modes:

- **Independent channel mode:** Independent channel mode gives a maximum of 96 GB of usable memory with one CPU installed, and 192 GB of usable memory with 2 CPUs installed (using 16 GB DIMMs). The DIMMs can be installed without matching sizes. See the table below for the memory installation order.

Table 3. System memory configuration for independent channel mode **(1 microprocessor)**

Installed memory	**DIMM socket**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1 DIMM		X										
2 DIMMs		X		X								
3 DIMMs		X		X		X						
4 DIMMs	X	X		X		X						
5 DIMMs	X	X	X	X		X						
6 DIMMs	X	X	X	X	X	X						

Table 4. System memory configuration for independent channel mode **(2 microprocessors)**

Installed memory	DIMM socket											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
2 DIMMs		X						X				
3 DIMMs		X		X				X				
4 DIMMs		X		X				X		X		
5 DIMMs		X		X		X		X		X		
6 DIMMs		X		X		X		X		X		X
7 DIMMs	X	X		X		X		X		X		X
8 DIMMs	X	X		X		X	X	X		X		X
9 DIMMs	X	X	X	X		X	X	X		X		X
10 DIMMs	X	X	X	X		X	X	X	X	X		X
11 DIMMs	X	X	X	X	X	X	X	X	X	X		X
12 DIMMs	X	X	X	X	X	X	X	X	X	X	X	X

- **Mirrored channel mode:** In mirrored channel mode, channels 2 and 5 are unused. The memory contents on channel 0 are duplicated in channel 1, and the memory contents of channel 3 are duplicated in channel 4. The effective memory available to the system is only half of that installed. The maximum available memory (with 16 GB DIMMs) is 32 GB for a single CPU system and 64 GB for a dual CPU system.

  Important: The memory configuration of channel 0 must match that of channel 1, and the memory configuration of channel 3 must match that of channel 4. For example, if a 4 GB Dual Rank DIMM is installed into the DIMM2 connector, then a 4 GB Dual Rank DIMM must also be installed into the DIMM6 connector. Table 2 on page 29 lists each channel and which DIMM connectors belong to the channel.

  The following table shows the order that memory DIMMs are installed to use a mirrored channel mode.

Table 5. System memory configuration for mirrored channel mode **(1 microprocessor)**

Installed memory	DIMM socket											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
2 DIMMs		X				X						
4 DIMMs	X	X			X	X						

Table 6. System memory configuration for mirrored channel mode **(2 microprocessors)**

Installed memory	DIMM socket											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
4 DIMMs		X				X		X				X
6 DIMMs	X	X			X	X		X				X
8 DIMMs	X	X			X	X	X	X			X	X

- **Spare channel mode:** In spare channel mode, channel 2 is the spare of the active channels 0 and 1. The spare channel is not available as active memory. The maximum memory available (with 16 GB DIMMs) is 64 GB in a single CPU system and 128 GB in a dual CPU system. All three channels must have

identical population with regards to size and organization. DIMMs within a channel do not have to be identical. The population ordering for spare channel mode is shown in the table below.

Note: Spare channel mode is only supported if the blade server has an Intel Xeon 5600 series microprocessor. Use the Setup utility to view the system summary and verify the type of microprocessor installed in your blade server (see "Using the Setup utility" on page 56).

The following table shows the order that memory DIMMs are installed to use spare channel mode.

Table 7. System memory configuration for spare channel mode **(1 microprocessor)**

Installed memory	DIMM socket 1	2	3	4	5	6	7	8	9	10	11	12
3 DIMMs		X		X		X						
6 DIMMs	X	X	X	X	X	X						

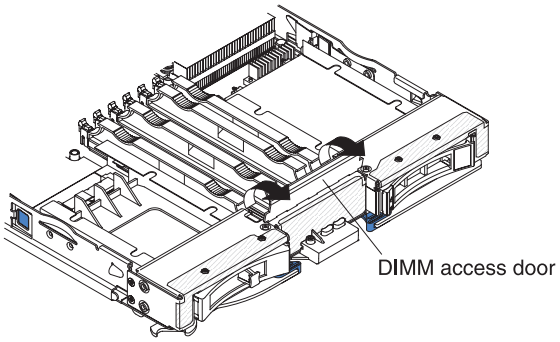
Table 8. System memory configuration for spare channel mode **(2 microprocessors)**

Installed memory	DIMM socket 1	2	3	4	5	6	7	8	9	10	11	12
6 DIMMs		X		X		X		X		X		X
9 DIMMs	X	X	X	X	X	X		X		X		X
12 DIMMs	X	X	X	X	X	X	X	X	X	X	X	X

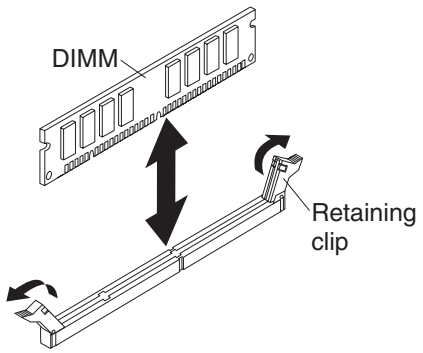
To install a DIMM, complete the following steps:

1. Before you begin, read “Safety” on page v and “Installation guidelines” on page 21.
2. Read the documentation that comes with the DIMMs.
3. If the blade server is installed in a BladeCenter unit, remove it (see “Removing the blade server from the BladeCenter unit” on page 23 for instructions).
4. Carefully lay the blade server on a flat, static-protective surface.
5. Open the blade server cover (see “Removing the blade server cover” on page 24 for instructions).
6. If an expansion unit is installed and you are installing DIMMs on the system board, remove the expansion unit (see “Removing an optional expansion unit” on page 26).
7. Locate the DIMM connectors (see “Blade server connectors” on page 19). Determine which DIMM connector you will be installing memory into.
8. If a DIMM filler or another memory module is already installed in the DIMM connector, remove it (see “Removing a memory module” on page 33).

   Note: A DIMM or DIMM filler must occupy each DIMM socket before the blade server is turned on.
9. If you are installing a DIMM in DIMM connector seven through twelve, use your fingers to lift the DIMM access door.



10. Touch the static-protective package that contains the DIMM to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component in the rack in which you are installing the DIMM for at least two seconds; then, remove the DIMM from its package.
11. To install the DIMMs, repeat the following steps for each DIMM that you install:



a. Make sure that the retaining clips are in the open position, away from the center of the DIMM connector.
b. Turn the DIMM so that the DIMM keys align correctly with the DIMM connector on the system board.

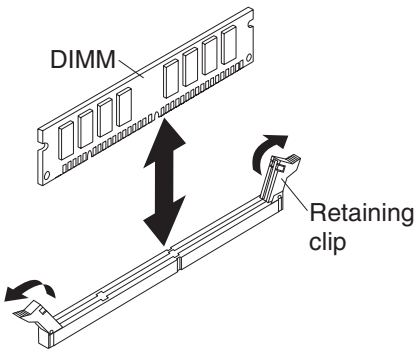
   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, handle the clips gently.
c. Press the DIMM into the DIMM connector. The retaining clips will lock the DIMM into the connector.
d. Make sure that the small tabs on the retaining clips are in the notches on the DIMM. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. Press the DIMM firmly into the connector, and then press the retaining clips toward the DIMM until the tabs are fully seated. When the DIMM is correctly installed, the retaining clips are parallel to the sides of the DIMM.

12. If the DIMM access door is open, use your fingers to close it.
13. If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 49.

Removing a memory module

Use this information to remove a memory module from the blade server.

The following illustration shows how to remove a DIMM from the blade server. This information also applies to removing a DIMM filler.



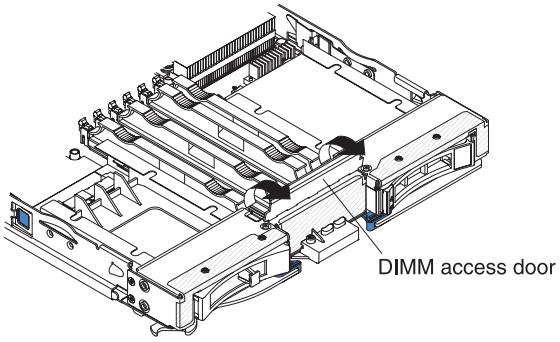
To remove a DIMM, complete the following steps.

1. Before you begin, read "Safety" on page v and "Installation guidelines" on page 21.
2. If the blade server is installed in a BladeCenter unit, remove it (see "Removing the blade server from the BladeCenter unit" on page 23).
3. Remove the blade server cover (see "Removing the blade server cover" on page 24).
4. If an optional expansion unit is installed, remove the expansion unit (see "Removing an optional expansion unit" on page 26).
5. Locate the DIMM connectors (see "Blade server connectors" on page 19). Determine which DIMM you want to remove from the blade server.

   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, handle the clips gently.

6. Move the retaining clips on the ends of the DIMM connector to the open position by pressing the retaining clips away from the center of the DIMM connector.

   Note: To access DIMM connector seven through twelve, use your fingers to lift the DIMM access door.



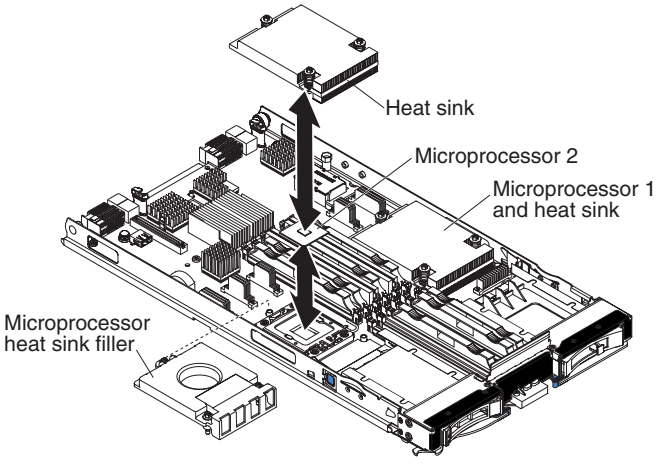
7. Using your fingers, pull the DIMM out of the connector.
8. Install a DIMM or DIMM filler in each empty DIMM connector (see "Installing a memory module" on page 29).

   Note: A DIMM or DIMM filler must occupy each DIMM socket before the blade server is turned on.

Installing a microprocessor and heat sink

Use this information to install a microprocessor and heat sink in the blade server.

The following illustration shows how to install a microprocessor and heat sink in the blade server.



Note: If you install an additional microprocessor, it must have the same type, speed, and power specifications as the first microprocessor.

To use SMP, obtain an SMP-capable operating system. For a list of supported operating systems and other optional devices, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

To install a microprocessor and heat sink, complete the following steps.

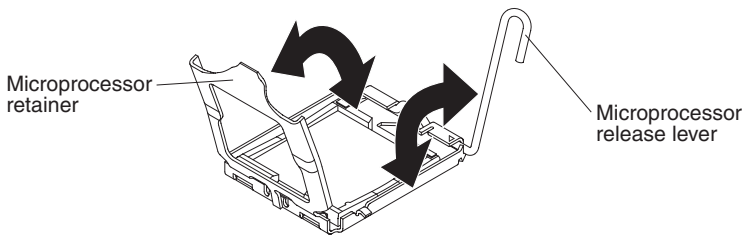
The following notes describe the type of microprocessor that the server supports and other information that you must consider when you install a microprocessor:

- If you are installing a second microprocessor, make sure that microprocessor 2 is identical to microprocessor 1. Information about the microprocessor installed in your blade server can be viewed in the Setup utility (see "Using the Setup utility" on page 56).
- For a list of microprocessors that the blade server supports, see http://www.ibm.com/servers/eserver/serverproven/compat/us/
- Before you install a new microprocessor, download and install the most current level of BIOS code (see "Firmware updates" on page 62).
- The microprocessors terminate themselves; therefore, no terminator card is required if microprocessor socket 2 is empty on the blade server or on the MPE. However, for proper airflow, socket 2 must contain a microprocessor heat-sink filler, sometimes called a microprocessor baffle.
- The microprocessor speeds are automatically set for the blade server; therefore, you do not have to set any microprocessor frequency-selection jumpers or switches.

Attention:

1. Do not use any tools or sharp objects to lift the locking lever on the microprocessor socket. Doing so might result in permanent damage to the system board.
2. Do not touch the contacts in the microprocessor socket. Touching these contacts might result in permanent damage to the system board.

1. Before you begin, read "Safety" on page v and "Installation guidelines" on page 21.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from the BladeCenter unit" on page 23 for instructions.
3. Carefully lay the blade server on a flat, static-protective surface.
4. Open the blade server cover (see "Removing the blade server cover" on page 24 for instructions).
5. If you are installing a microprocessor in the blade server and a MPE unit or expansion unit is attached to the blade server, remove the device (see "Removing an optional expansion unit" on page 26).
6. Locate microprocessor socket 2 (see "Blade server connectors" on page 19).
7. Loosen the four captive screws that secure the heat-sink filler and then remove the filler from the microprocessor socket.
8. Install the microprocessor and heat sink.



   a. If a protective cover is installed on the microprocessor retainer, use your fingers to remove the protective cover.

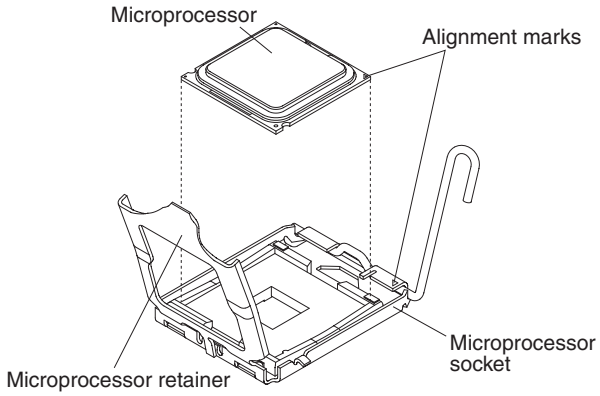
b. Rotate the locking lever on the microprocessor socket from its closed and locked position until it stops in the fully open position (approximately a 135° angle), as shown.

c. Rotate the microprocessor retainer on the microprocessor socket from its closed position until it stops in the fully open position (approximately a 135° angle), as shown.

d. If a dust cover is installed over the microprocessor socket, lift the dust cover from the socket.

e. Touch the static-protective package that contains the microprocessor to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the microprocessor from the package.

f. Remove the dust cover from the bottom of the microprocessor.



g. Orient the triangle painted on the corner of the microprocessor with the triangle on the microprocessor socket.

h. Carefully place the microprocessor into the microprocessor socket, using the alignment tabs on the microprocessor with the alignment notches in the microprocessor socket as a guide.

Attention:

- Do not press the microprocessor into the socket.
- Make sure that the microprocessor is oriented and aligned correctly in the socket before you try to close the microprocessor retainer.

i. Carefully close the microprocessor retainer.

j. Rotate the locking lever on the microprocessor socket to the closed and locked position. Make sure that the lever is secured in the locked position by pressing the tab on the microprocessor socket.

9. Install a heat sink on the microprocessor.

Attention:

- Do not set down the heat sink after you remove the plastic cover.
- Do not touch the thermal material on the bottom of the heat sink. Touching the thermal material will contaminate it. If the thermal material on the microprocessor or heat sink becomes contaminated, contact your service technician.

a. Remove the plastic protective cover from the bottom of the heat sink.

b. Make sure that the thermal material is still on the bottom of the heat sink; then, align and place the heat sink on top of the microprocessor in the retention bracket, thermal material side down. Press firmly on the heat sink.

c. Align the three screws on the heat sink with the holes on the heat-sink retention module.
d. Press firmly on the captive screws and tighten them with a screwdriver, alternating among the screws until they are tight. If possible, each screw should be rotated two full rotations at a time. Repeat until the screws are tight. Do not overtighten the screws by using excessive force. If you are using a torque wrench, tighten the screws to 8.5 Newton-meters (Nm) to 13 Nm (6.3 foot-pounds to 9.6 foot-pounds).

10. Reinstall the memory module or DIMM filler closest to the microprocessor you installed.
    a. If you installed microprocessor 1, install the memory module into DIMM connector 1 (see "Installing a memory module" on page 29).
    b. If you installed microprocessor 2, install the memory module into DIMM connector 6 (see "Installing a memory module" on page 29).
11. If you are using a single microprocessor, make sure that memory modules are installed in DIMM socket 2 and DIMM socket 6. If two microprocessors installed in the blade server, make sure that memory modules are installed in DIMM socket 2, DIMM socket 6, DIMM socket 8, and DIMM socket 12. See "Installing a memory module" on page 29 for more information on installing a memory module.
12. Install the optional expansion unit, if you removed one from the blade server to replace the battery (see "Installing an optional expansion unit" on page 25 for instructions).

Thermal grease

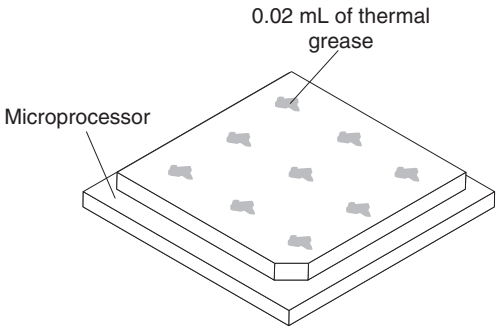
Use this information to determine the guidelines for using thermal grease on a heat sink and processor.

The thermal grease must be replaced whenever the heat sink has been removed from the top of the microprocessor and is going to be reused or when debris is found in the grease.

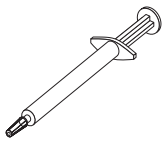
To replace damaged or contaminated thermal grease on the microprocessor and heat sink, complete the following steps:

1. Place the heat-sink assembly on a clean work surface.
2. Remove the cleaning pad from its package and unfold it completely.
3. Use the cleaning pad to wipe the thermal grease from the bottom of the heat sink.

   Note: Make sure that all of the thermal grease is removed.
4. Use a clean area of the cleaning pad to wipe the thermal grease from the microprocessor; then, dispose of the cleaning pad after all of the thermal grease is removed.



5. Use the thermal-grease syringe to place nine uniformly spaced dots of 0.02 mL each on the top of the microprocessor.



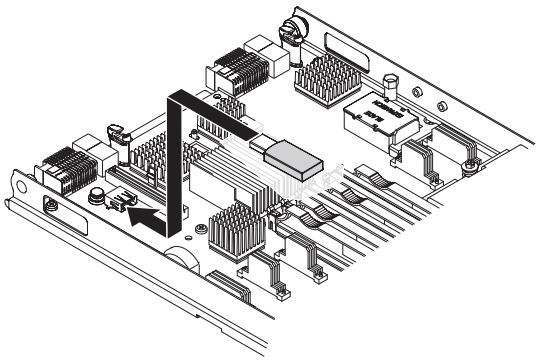
Note: 0.01mL is one tick mark on the syringe. If the grease is properly applied, approximately half (0.22 mL) of the grease will remain in the syringe.

6. Continue with step 8 on page 35.

Installing a USB Flash key

Use these instructions to install a USB Flash key in the blade server.

The following illustration shows the installation of the USB Flash key.



To install a USB module, complete the following steps:

1. Before you begin, read “Safety” on page v and “Installation guidelines” on page 21.
2. Read the documentation that comes with the DIMMs.
3. If the blade server is installed in a BladeCenter unit, remove it (see “Removing the blade server from the BladeCenter unit” on page 23 for instructions).
4. Carefully lay the blade server on a flat, static-protective surface.
5. Open the blade server cover (see “Removing the blade server cover” on page 24 for instructions).

6. If an expansion unit is installed, remove the expansion unit (see "Removing an optional expansion unit" on page 26).
7. If a CIOv expansion card is installed, remove the expansion card (see "Removing a CIOv-form-factor expansion card" on page 43).
8. Locate the USB connector on the blade server (see "Blade server connectors" on page 19).
9. Touch the static-protective package that contains the USB Flash key to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component in the rack in which you are installing the USB module for at least two seconds; then, remove the USB module from its package.
10. Orient the connector on the USB Flash key with the USB connector on the blade server.
11. Use your fingers to push the USB Flash key into the USB connector on the blade server.
12. If a CIOv expansion card was removed during the install process, install the expansion card (see "Installing a CIOv-form-factor expansion card" on page 42).
13. If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 49.

I/O expansion cards

Use this information to install an I/O expansion card, such as a SAS connectivity card, in the blade server.

The illustrations show installation of the SAS connectivity card in the system board; installing the card in an expansion unit is similar.

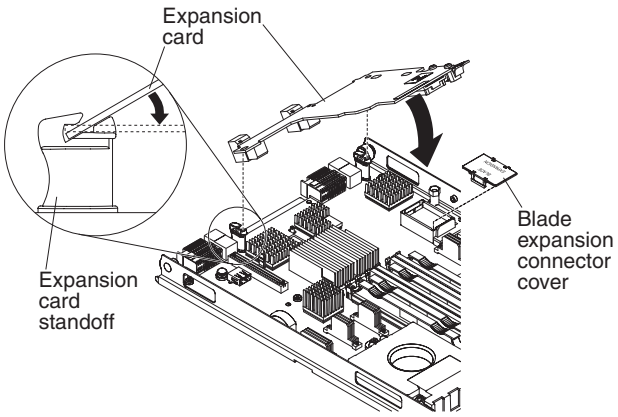
The blade server has two I/O expansion connectors on the system board. One connector supports horizontal combination-form-factor (CFFh) expansion cards and the other connector supports vertical-combination-I/O (CIOv) expansion cards. See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for a list of available I/O expansion cards for your blade server.

Make sure that the BladeCenter unit and the I/O modules to which the I/O expansion card is mapped support the network-interface type of the I/O expansion card. For example, if you add an Ethernet expansion card to a blade server, the I/O modules in I/O-module bays 3 and 4 on the BladeCenter unit must both be compatible with the expansion card. All other expansion cards that are installed in other blade servers in the BladeCenter unit must also be compatible with these I/O modules. In this example, you can then install two Ethernet switch modules, two pass-thru modules, or one Ethernet switch module and one pass-thru module in the BladeCenter unit. Because pass-thru modules are compatible with a variety of I/O expansion cards, installing two pass-thru modules enables the use of several types of compatible I/O expansion cards in blade servers within the same BladeCenter unit.

Installing a horizontal-compact-form-factor expansion card

Use these instructions to install a compact-form-factor expansion card in the blade server.

The blade server supports a horizontal-combination-form-factor (CFFh) expansion card. The following illustration shows how to install a CFFh expansion card.



To install a CFFh expansion card, complete the following steps:

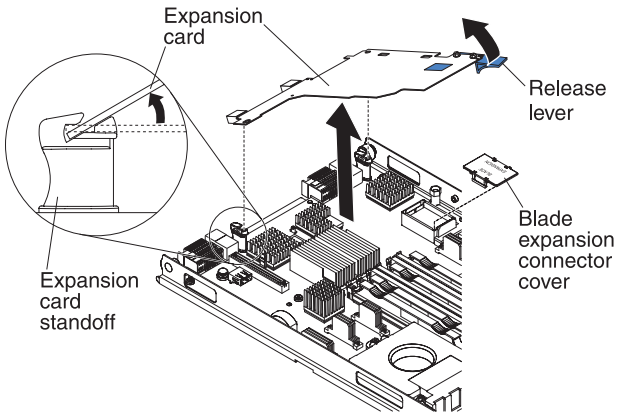
1. Before you begin, read "Safety" on page v and "Installation guidelines" on page 21.
2. If the blade server is installed in a BladeCenter unit, remove it (see "Removing the blade server from the BladeCenter unit" on page 23 for instructions).
3. Carefully lay the blade server on a flat, static-protective surface.
4. Open the blade server cover (see "Removing the blade server cover" on page 24 for instructions).
5. Locate the blade server expansion connector (see "Blade server connectors" on page 19).
6. If a cover is installed on the blade expansion connector, remove it by using your fingers to lift the cover from the blade expansion connector.
7. Touch the static-protective package that contains the expansion card to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the expansion card from the package.
8. Orient the expansion card and slide the slots at the back end of the card onto the pins on the expansion-card standoff; then, gently pivot the card into the blade server expansion connector.
9. Firmly press on the indicated locations to seat the expansion card.

   Note: For device-driver and configuration information to complete the installation of the expansion card, see the documentation that comes with the expansion card.
10. If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 49.

Removing a horizontal-compact-form-factor expansion card

Use these instructions to remove a compact-form-factor expansion card from the blade server.

The following illustration shows how to remove a horizontal-compact-form-factor (CFFh) expansion card.



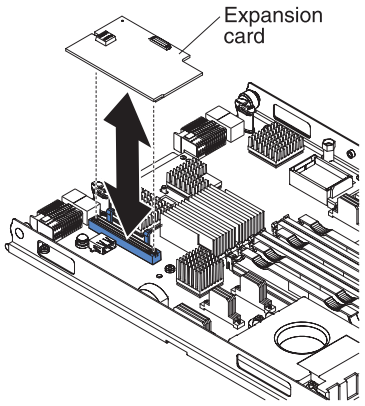
To remove a CFFh expansion card, complete the following steps:

1. Before you begin, read "Safety" on page v and "Installation guidelines" on page 21.
2. If the blade server is installed in a BladeCenter unit, remove it (see "Removing the blade server from the BladeCenter unit" on page 23 for instructions).
3. Carefully lay the blade server on a flat, static-protective surface.
4. Open the blade server cover (see "Removing the blade server cover" on page 24 for instructions).
5. Locate the CFFh expansion card. The CFFh is installed into the blade expansion connector (see "Blade server connectors" on page 19).
6. Use your fingers to hold the edge of the CFFh expansion card where it connects to the blade expansion connector; then, lift up on the card.
7. Pull the card away from the expansion-card standoff.

Installing a CIOv-form-factor expansion card

Use these instructions to install a CIOv-form-factor expansion card in the blade server.

The blade server supports a vertical-combination-I/O (CIOv) expansion card and a horizontal-combination-form-factor (CFFh) expansion card. The following illustration shows the location and installation of a CIOv expansion card.



To install a CIOv expansion card, complete the following steps:

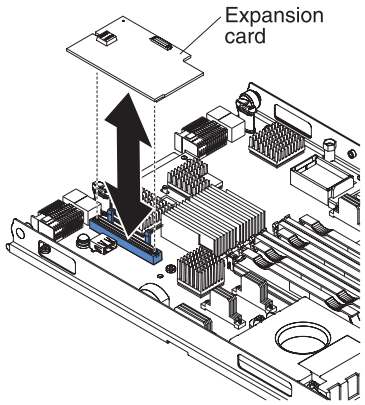
1. Before you begin, read “Safety” on page v and “Installation guidelines” on page 21.
2. If the blade server is installed in a BladeCenter unit, remove it (see “Removing the blade server from the BladeCenter unit” on page 23 for instructions).
3. Carefully lay the blade server on a flat, static-protective surface.
4. Open the blade server cover (see “Removing the blade server cover” on page 24 for instructions).
5. Touch the static-protective package that contains the expansion card to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the expansion card from the package.
6. Locate the CIOv expansion connector (see “Blade server connectors” on page 19).
7. Orient the connector on the expansion card with the CIOv expansion connector on the system board; then, press the card into the CIOv expansion connector.
8. Firmly press on the indicated locations to seat the expansion card.

   Note: For device-driver and configuration information to complete the installation of the expansion card, see the documentation that comes with the expansion card.
9. If you have other devices to install or remove, do so now; otherwise, go to “Completing the installation” on page 49.

Removing a CIOv-form-factor expansion card

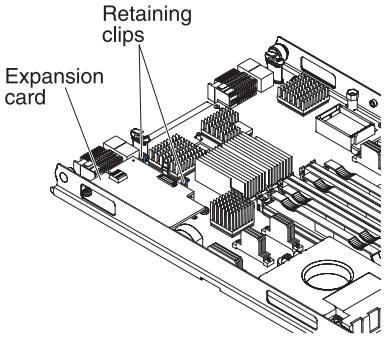
Use these instructions to remove a CIOv-form-factor expansion card in the blade server.

The following illustration shows how to remove a vertical-combination-I/O (CIOv) expansion card.



To removel a CIOv expansion card, complete the following steps:

1. Before you begin, read “Safety” on page v and “Installation guidelines” on page 21.
2. If the blade server is installed in a BladeCenter unit, remove it (see “Removing the blade server from the BladeCenter unit” on page 23 for instructions).
3. Carefully lay the blade server on a flat, static-protective surface.
4. Open the blade server cover (see “Removing the blade server cover” on page 24 for instructions).
5. Touch the static-protective package that contains the expansion card to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the expansion card from the package.
6. Locate the CIOv expansion connector (see “Blade server connectors” on page 19).



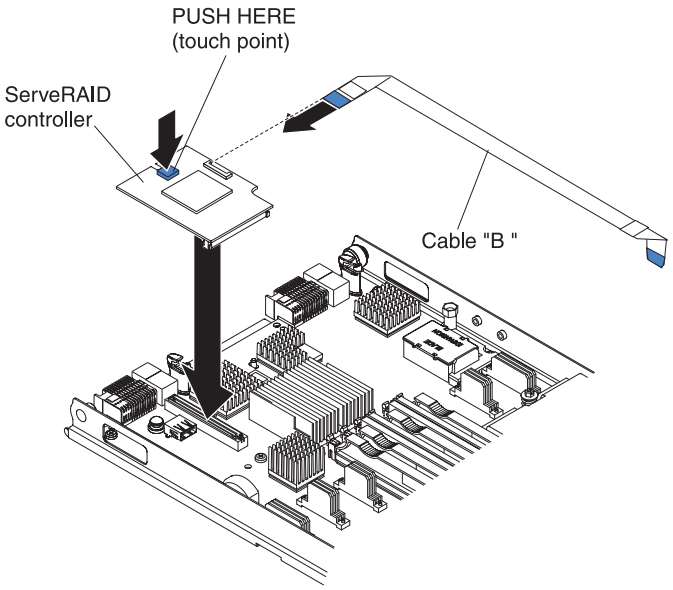
7. Using your fingers, move the retaining clips away from the CIOv card; then, lift the card out of the connector.

Installing a storage interface card

Use this information to install a storage interface card in the blade server.

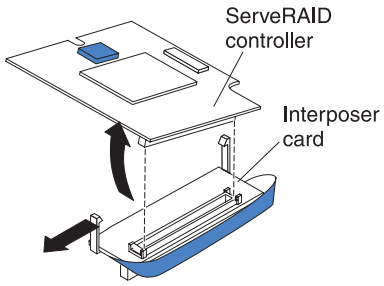
The storage interface card controls the SAS hot-swap storage drives. The following illustrations and installation instructions shows how to install a ServeRAID-MR10ie controller into the CIOv expansion connector of the blade server. The illustrations and installation instructions are similar for other CIOv storage interface cards.

Note: The backup-battery will be installed in DIMM connector seven and might affect how much memory is recognized by the blade server. Review the tables in "Installing a memory module" on page 29 to make sure that your memory configuration will not be affected.



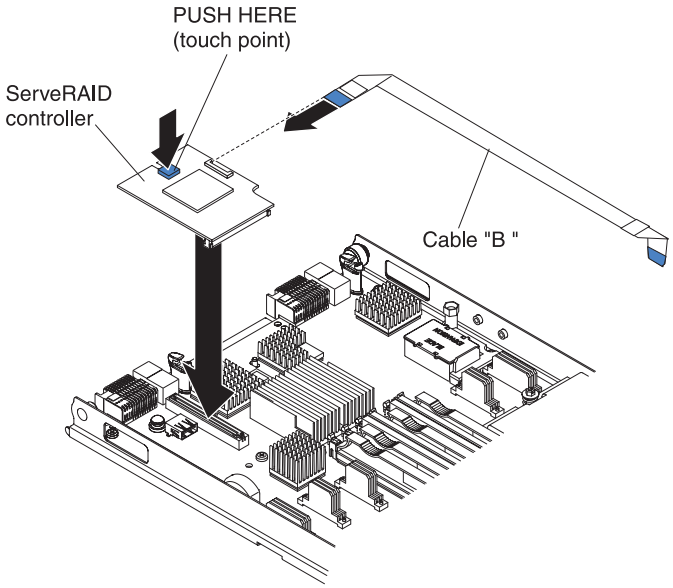
To install a storage interface card, complete the following steps.

1. Before you begin, read "Safety" on page v and "Installation guidelines" on page 21.
2. If the blade server is installed in a BladeCenter unit, remove it (see "Removing the blade server from the BladeCenter unit" on page 23 for instructions).
3. Remove the blade server cover (see "Removing the blade server cover" on page 24 for instructions).
4. If an optional expansion unit is installed, remove the expansion unit (see "Removing an optional expansion unit" on page 26).
5. Locate the CIOv expansion connector (see "Blade server connectors" on page 19).
6. Touch the static-protective package that contains the storage interface card to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the storage interface card from the package.
7. If an interposer card is installed on the storage interface card, remove it.



a. If the interposer has a pull strap, move the pull strap away from the storage interface card. If the pull strap surrounds the storage interface card, the pull strap will interfere with the removal of the interposer card.
b. Press out on the plastic latch that holds the interposer card to the storage interface card and simultaneously lift up on the controller, as shown.
c. Separate the interposer card from the storage interface card and store the interposer card in a safe place.

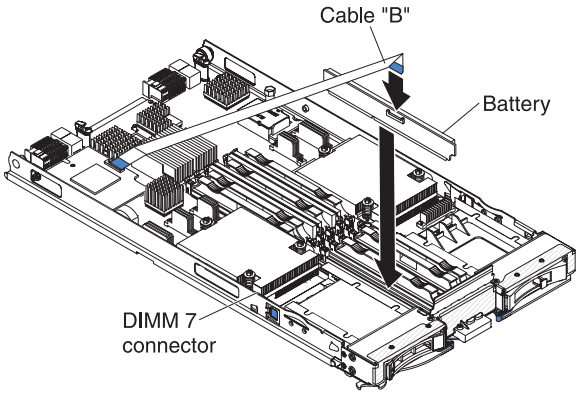
8. Install the backup-battery cable to the storage interface card.
   a. If you are installing a ServeRAID-MR10ie controller, select cable "B" from the packaging.
   b. Locate the end of the cable marked “EXPANSION CARD”; then, with the blue side of the cable end facing up, carefully insert the cable end into the cable connector on the ServeRAID controller.



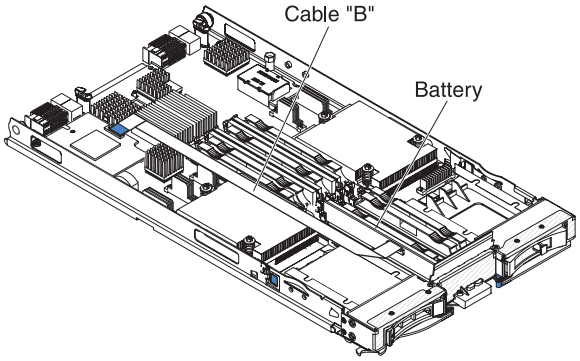
9. Orient the connector on the storage interface card with the CIOv expansion connector on the system board; then, press the storage interface card into the CIOv expansion connector.
10. Firmly press on the indicated locations to seat the storage interface card.

    Note: For device-driver and configuration information to complete the installation of the expansion card, see the documentation that comes with the storage interface card.
11. Install the backup battery for the storage interface card into DIMM connector seven (see “Blade server connectors” on page 19 and “Installing a memory

module" on page 29).



12. Install the backup-battery cable to the backup battery. The side of the cable with the blue touchpoint should be oriented towards the center of the blade server.
13. Orient the backup-battery cable so that it lays flat over the top of the heat sink for microprocessor two.

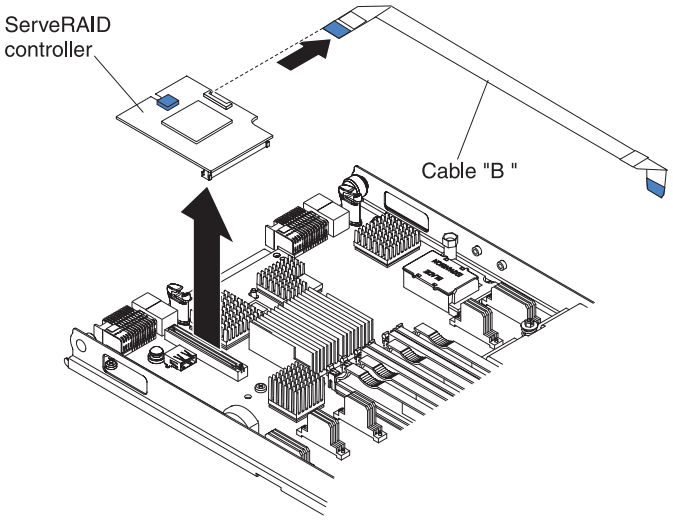


14. If you have other devices to install or remove, do so now; otherwise, go to "Completing the installation" on page 49.

Removing a storage interface card

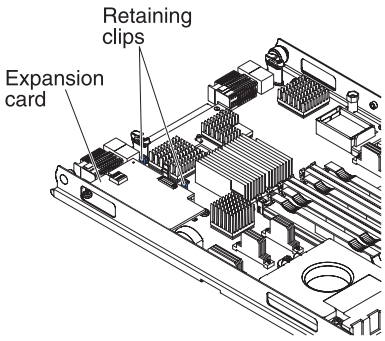
Use this information to remove a storage interface card from the blade server.

The storage interface card controls the SAS hot-swap storage drives. The following illustrations and installation instructions shows how to remove a ServeRAID-MR10ie CIOv storage interface card from the blade server. The illustrations and removal instructions are similar for other CIOv storage interface cards.



To remove a storage interface card, complete the following steps.

1. Before you begin, read “Safety” on page v and “Installation guidelines” on page 21.
2. If the blade server is installed in a BladeCenter unit, remove it (see “Removing the blade server from the BladeCenter unit” on page 23 for instructions).
3. Remove the blade server cover (see “Removing the blade server cover” on page 24 for instructions).
4. If an optional expansion unit is installed, remove the expansion unit (see “Removing an optional expansion unit” on page 26). The storage-interface-card option includes the storage interface card, backup battery, and backup-battery cable. These parts can be removed separately from each other.
5. To remove the storage interface card, complete the following steps.
   a. Locate the storage interface card installed in the CIOv connector on the system board (see “Blade server connectors” on page 19).



b. Gently push the retaining clips away from the expansion card; then, lift the card out of the expansion-card connector.

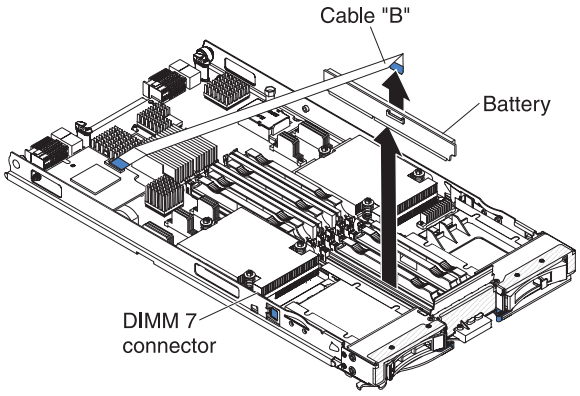
c. Remove the cable from the storage interface card by holding the card in one hand; then, use your other hand to pull the cable away from the card. When pulling the cable, make sure that you hold the cable where there is a blue touchpoint.

6. To remove the backup-battery cable, complete the following steps.

   a. Remove the cable from the storage interface card by holding the blue touchpoint on the cable; then, pull the cable away from the card.

   b. Remove the cable from the backup battery by holding the blue touchpoint on the cable; then, pull the cable away from the backup battery.

7. The backup battery is installed in DIMM connector seven. To remove the backup battery, complete the following steps.



   a. If you have not already done so, remove the backup-battery cable from the backup battery by holding the blue touchpoint on the cable; then, pull the cable away from the backup battery.

   b. Remove the backup battery from the DIMM connector seven by using the instructions to remove a memory module (see “Removing a memory module” on page 33).

8. Remove the backup battery from DIMM connector seven.

Completing the installation

To complete the installation, complete the following tasks.

1. Reinstall the optional expansion unit, if you removed one to install other devices (see “Installing an optional expansion unit” on page 25 for information on installing the expansion unit).
2. Close the blade server cover, unless you installed an optional expansion unit that has its own cover (see “Closing the blade server cover” on page 50).

   Statement 21

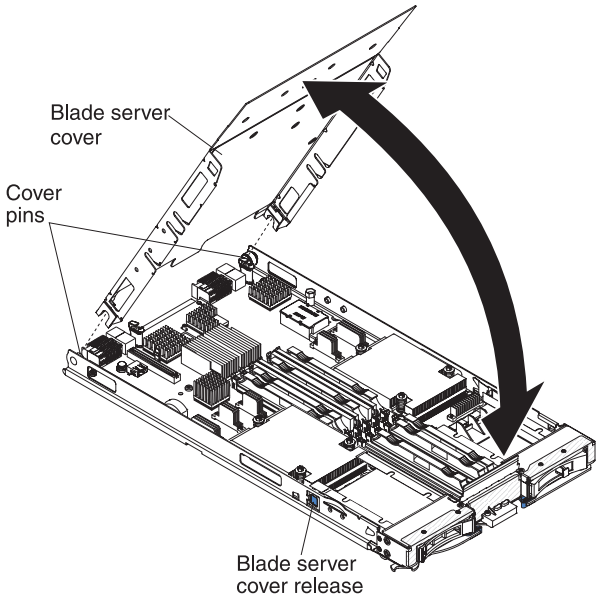
   CAUTION:
   Hazardous energy is present when the blade server is connected to the power source. Always replace the blade server cover before installing the blade server.
3. Reinstall the blade server into the BladeCenter unit (see “Installing the blade server in a BladeCenter unit” on page 51).
4. Turn on the blade server (see “Turning on the blade server” on page 18).If you have just connected the power cords of the BladeCenter unit to electrical outlets, you must wait until the power-on LED on the blade server flashes slowly before you press the power-control button.
5. For certain optional devices, you might have to run the blade server Setup utility to configure the blade server (see Chapter 4, “Configuring the blade server,” on page 55). See the documentation that comes with your optional device for additional information.

Closing the blade server cover

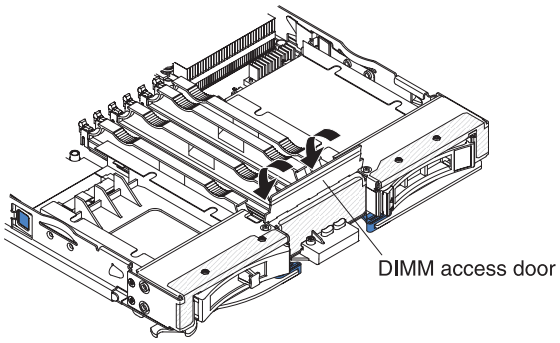
Use these instructions for information about how to close the blade server cover.

Attention: You cannot insert the blade server into the BladeCenter unit until the cover is installed and closed or an expansion unit is installed. Do not attempt to override this protection.

To close the blade server cover, complete the following steps:



1. Read the safety information that begins on page "Safety" on page v and "Installation guidelines" on page 21.
2. Close the DIMM access door by rotating the door towards the DIMM connectors.

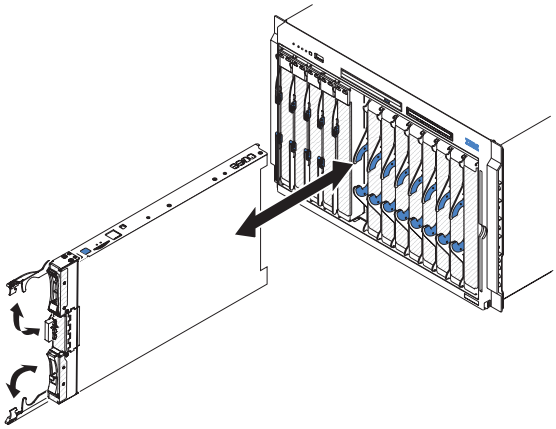


3. If you removed an expansion unit from the blade server, install it now (see "Installing an optional expansion unit" on page 25).
4. Lower the cover so that the slots at the rear slide down onto the pins at the rear of the blade server, as shown in the illustration. Before you close the cover, make sure that all components are installed and seated correctly and that you have not left loose tools or parts inside the blade server.
5. Pivot the cover to the closed position, as shown in the illustration, until it clicks into place.

Installing the blade server in a BladeCenter unit

Use these instructions to install the blade server in a BladeCenter unit.

The following illustration shows how to install a blade server into a BladeCenter unit. The appearance of your BladeCenter unit might be different; see the documentation for your BladeCenter unit for additional information. To install a blade server in a BladeCenter unit, complete the following steps.



Statement 21

CAUTION:
Hazardous energy is present when the blade server is connected to the power source. Always replace the blade cover before installing the blade server.

1. Before you begin, read “Safety” on page v and “Installation guidelines” on page 21.
2. Select the blade bay for the blade server; at least one blade bay is required.

   Notes:

   a. When any blade server or device is in blade bay 7 through 14, power modules must be installed in all four power-module bays. For additional information, see the *Installation and User's Guide* that comes with the BladeCenter unit.

   b. If you are reinstalling a blade server that you removed, you must install it in the same blade bay from which you removed it. Some blade server configuration information and update options are established according to blade server bay number. Reinstalling a blade server into a different blade server bay number from the one which it was removed can have unintended consequences, and you might have to reconfigure the blade server.

   c. To help ensure proper cooling, performance, and system reliability, make sure that each blade bay on the front of the BladeCenter unit contains a blade server, expansion unit, or blade filler. Do not operate a BladeCenter unit for more than 1 minute without a blade server, expansion unit, or blade filler in each blade bay.

3. Make sure that the release handles on the blade server are in the open position (perpendicular to the blade server).
4. Slide the blade server into the blade bay until it stops.
5. Push the release handles on the front of the blade server to the closed position.

   Note: After the blade server is installed, the service processor in the blade server initializes and synchronizes with the management module. This process takes approximately two minutes to complete. The power-on LED flashes rapidly, and the power-control button on the blade server does not respond until this process is complete.
6. Turn on the blade server (see "Turning on the blade server" on page 18 for instructions).
7. Make sure that the power-on LED on the blade server control panel is lit continuously, indicating that the blade server is receiving power and is turned on.
8. If you have other blade servers to install, do so now.
9. Optional: Write identifying information on one of the labels that come with the blade servers and place the label on the BladeCenter unit bezel. See the documentation for your BladeCenter unit for information about the label placement.

   Important: Do not place the label on the blade server or in any way block the ventilation holes on the blade server.
10. Reinstall the bezel assembly on the BladeCenter T unit (BladeCenter T unit only). For detailed instructions for reinstalling the bezel assembly, see the *Installation and User's Guide* that comes with the BladeCenter T unit.

If this is the initial installation of the blade server in the BladeCenter unit, you must configure the blade server through the Setup utility and install the blade server operating system. See "Updating the blade server configuration" on page 53 and Chapter 5, "Installing the operating system," on page 69 for details.

If you have changed the configuration of the blade server or if you are installing a different blade server from the one that you removed, you must configure the blade server through the Setup utility, and you might have to install the blade server operating system. For more information, see "Using the Setup utility" on page 56.

Updating the blade server configuration

Use this information to update the blade server configuration.

When the blade server starts for the first time after you add or remove an internal device, you might receive a message that the configuration has changed. The Setup utility automatically starts so that you can save the new configuration settings. See "Using the Setup utility" on page 56 for more information about the Setup utility.

Some options have device drivers that you must install. See the documentation that comes with each device for information about installing device drivers.

The blade server operates as a symmetric multiprocessing (SMP) server, regardless of how many microprocessors are installed. For optimum performance, you must upgrade the operating system to support SMP. See Chapter 5, "Installing the operating system," on page 69 and your operating-system documentation for additional information.

Input/output connectors and devices

Use this information to locate the input/output connectors and devices.

The input/output connectors that are available to the blade server are supplied by the BladeCenter unit. See the documentation that comes with the BladeCenter unit for information about the input/output connectors.

The blade server has two selection buttons on the control panel: the media tray select button and the keyboard/video/mouse select button. See "Blade server controls and LEDs" on page 15 for information about these buttons and their functions.

The Ethernet controllers on the blade server communicate with the network through the Ethernet-compatible I/O modules in the BladeCenter unit. Network signals to and from the blade server or any expansion cards are automatically routed to a same-network-interface I/O module through circuitry in the BladeCenter unit.

Chapter 4. Configuring the blade server

Use this information for details about the configuration requirements of the blade server.

This chapter describes the configuration requirements of the blade server. Before you continue, make sure that the blade server has the latest version of firmware code. For additional information, see "Firmware updates" on page 62.

The following configuration programs come with the blade server:

- **Setup utility**

  The Setup utility is used to change system settings, such as interrupt requests (IRQ), date and time, and password. See "Using the Setup utility" on page 56 for more information.

- **LSI Logic Configuration Utility program**

  The LSI Logic Configuration Utility program is stored in the blade-server firmware. Use it to set the device scan order and to set the storage drive controller IDs. See "Using the LSI Logic Configuration Utility program" on page 64 for more information.

- **IBM *ServerGuide Setup and Installation* CD**

  The ServerGuide program provides software-setup tools and installation tools that are designed for the blade server. Use this CD during the installation of the blade server to configure basic hardware features and to simplify the installation of the operating system. For information about obtaining and using this CD, see "Using the ServerGuide Setup and Installation CD" on page 59.

- **Preboot Execution Environment (PXE) boot agent utility program**

  The PXE boot agent utility program is part of the blade server firmware. Use it to select the boot protocol and other boot options and to select a power-management option. For information about using this utility program, see "Using the PXE boot agent utility program" on page 62.

The IBM Remote Deployment Manager (RDM) Version 4.4 program is available for purchase. You can use RDM to install a UEFI code update onto a blade server. For the latest information about RDM, including which operating systems that RDM supports and how to purchase the software, see http://www.ibm.com/systems/management/.

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Using the Setup utility

Use these instructions to start the Setup utility.

To start the Setup utility, complete the following steps:

1. Turn on the blade server (see "Turning on the blade server" on page 18).
2. Immediately give the blade server control of the BladeCenter unit shared keyboard, video, and mouse ports.
   - If you are managing the blade server by using the BladeCenter system console, press the KVM select button on the blade server (see "Blade server controls and LEDs" on page 15 for information).
   - If you are managing the blade server from a remote location, see the *IBM BladeCenter Management Module User's Guide*, *IBM BladeCenter Management Module Command-Line Interface Reference Guide*, or *IBM BladeCenter Serial over LAN Setup Guide* for information and instructions.
3. When the prompt `Press <F1> Setup` is displayed, press F1. If you have set an administrator password, you must type the administrator password to access the full Setup-utility menu. If you do not type the administrator password, a limited Setup-utility menu is available.
4. Follow the instructions on the screen.

Setup utility menu

Use the Setup utility main menu to view and configure blade server configuration data and settings.

The following menu items are on the Setup utility main menu. Depending on the version of the Unified Extensible Firmware Interface (UEFI), some menu items might differ slightly from these descriptions.

- **System Information**

  Select this choice to view information about the server. When you make changes through other choices in the Setup utility, some of those changes are reflected in the system information; you cannot change settings directly in the system information. This choice is on the full Setup utility menu only.

  – **System Summary**

    Select this choice to view configuration information, including the ID, speed, and cache size of the microprocessors, machine type and model of the server, the serial number, the system UUID, and the amount of installed memory. When you make configuration changes through other options in the Setup utility, the changes are reflected in the system summary; you cannot change settings directly in the system summary.

  – **Product Data**

    Select this choice to view the system-board identifier, the revision level or issue date of the firmware, the integrated management module and diagnostics code, and the version and date.

  This choice is on the full UEFI Setup Utility menu only.

- **System Settings**

  Select this choice to view or change the server component settings.

  – **Processors**

    Select this choice to view or change the processor settings.

  – **Memory**

    Select this choice to view or change the memory settings.

– **Devices and I/O Ports**

  Select this choice to view or change assignments for devices and input/output (I/O) ports. You can configure the remote console redirection, enable or disable integrated Ethernet controllers, and the SAS controller. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device).

– **Power**

  Select this choice to view or change power capping to control power consumption and processor performance states.

– **Legacy Support**

  Select this choice to view or set legacy support.

  - **Force Legacy Video on Boot**

    Select this choice to force INT video support, if the operating system does not support UEFI video output standards.

  - **Rehook INT**

    Select this choice to enable or disable devices from taking control of the boot process. The default is **Disable**.

  - **Legacy Thunk Support**

    Select this choice to enable or disable UEFI to interact with PCI mass storage devices that are non-UEFI compliant.

– **Integrated Management Module**

  Select this choice to view or change the settings for the integrated management module.

  - **POST Watchdog Timer**

    Select this choice to view or enable the POST watchdog timer.

  - **POST Watchdog Timer Value**

    Select this choice to view or set the POST loader watchdog timer value.

  - **Reboot System on NMI**

    Enable or disable restarting the system whenever a nonmaskable interrupt (NMI) occurs. **Disabled** is the default.

  - **Network Configuration**

    Select this choice to view the system management network interface port, the IMM MAC address, the current IMM IP address, and host name; define the static IMM IP address, subnet mask, and gateway address, specify whether to use the static IP address or have DHCP assign the IMM IP address, save the network changes, and reset the IMM.

  - **Reset IMM to Defaults**

    Select this choice to view or reset IMM to the default settings.

– **System Security**

  Select this choice to view or configure security options.

– **Adapters and UEFI Drivers**

  Select this choice to view information about the adapters and UEFI drivers installed in the server.

– **Network**

  Select this choice to view or configure the network device options, such as iSCSI, PXE, and Broadcom.

– **Trusted Platform Module (TPM)**

  Select this choice to view and configure TPM settings.

- **Date and Time**

  Select this choice to set the date and time in the server, in 24-hour format (*hour*:*minute*:*second*).

  This choice is on the full UEFI Setup Utility menu only.
- **Start Options**

  Select this choice to view or change the start options, including the startup sequence, keyboard NumLock state, PXE boot option, and PCI device boot priority. Changes in the startup options take effect when you start the server.

  The startup sequence specifies the order in which the server checks devices to find a boot record. The server starts from the first boot record that it finds. If the server has Wake on LAN hardware and software and the operating system supports Wake on LAN functions, you can specify a startup sequence for the Wake on LAN functions. For example, you can define a startup sequence that checks for a disc in the CD-RW/DVD drive, then checks the hard disk drive, and then checks a network adapter.

  This choice is on the full UEFI Setup Utility menu only.
- **Boot Manager**

  Select this choice to view, add, delete, or change the device boot priority, boot from a file, select a one-time boot, or reset the boot order to the default setting.
- **System Event Logs**

  Select this choice to enter the System Event Manager, where you can view the error messages in the system event logs. You can use the arrow keys to move between pages in the error log.

  The system event logs contain all event and error messages that have been generated during POST, by the systems-management interface handler, and by the system service processor. Run the diagnostic programs to get more information about error codes that occur. See the *Problem Determination and Service Guide* for instructions on running the diagnostic programs.

  Important: If the system-error LED on the front of the server is lit but there are no other error indications, clear the IMM system-event log. Also, after you complete a repair or correct an error, clear the IMM system-event log to turn off the system-error LED on the front of the server.

  – **POST Event Viewer**

    Select this choice to enter the POST event viewer to view the POST error messages.

  – **IMM System Event Log**

    Select this choice to view the IMM system event log.

  – **Clear IMM System Event Log**

    Select this choice to clear the IMM system event log.
- **User Security**

  Select this choice to set, change, or clear passwords. See “Using passwords” on page 59 for more information.
- **Save Settings**

  Select this choice to save the changes that you have made in the settings.
- **Restore Settings**

  Select this choice to cancel the changes that you have made in the settings and restore the previous settings.
- **Load Default Settings**

Select this choice to cancel the changes that you have made in the settings and restore the factory settings.

- **Exit Setup**

  Select this choice to exit from the Setup utility. If you have not saved the changes that you have made in the settings, you are asked whether you want to save the changes or exit without saving them.

Using passwords

Use this information to set, change, or delete a power-on password.

You can set, change, and delete a power-on password in the Setup/Configuration utility by selecting **System Settings** then **System Security**.

If you set a power-on password, you must type the power-on password to complete the system startup and to have access to the Configuration/Setup Utility menu.

You can use any combination of up to seven characters (A - Z, a - z, and 0 - 9) for the password. Keep a record of your password in a secure place.

If you forget the power-on password, you can regain access to the blade server either by removing the blade server battery and then reinstalling it or by using the power-on password override switch (see the *Problem Determination and Service Guide* on the *Documentation* CD for instructions).

Using the ServerGuide Setup and Installation CD

Use this information as an overview for using the ServerGuide Setup and Installation CD.

The *ServerGuide Setup and Installation* CD contains a setup and installation program that is designed for your blade server. The ServerGuide program detects the blade server model and optional hardware devices that are installed and uses that information during setup to configure the hardware. The ServerGuide program simplifies operating-system installations by providing updated device drivers and, in some cases, installing them automatically.

You can download a free image of the *ServerGuide Setup and Installation* CD or purchase the CD from the ServerGuide fulfillment Web site at http://www.ibm.com/systems/management/serverguide/sub.html. To download the free image, click **IBM Service and Support Site**.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is in this document.

The ServerGuide program performs the following tasks:

- An easy-to-use interface
- Diskette-free setup and configuration programs that are based on detected hardware
- Device drivers that are provided for the blade server model and detected hardware
- Operating-system partition size and file-system type that are selectable during setup

ServerGuide features

Use this information to determine the ServerGuide features.

Features and functions can vary slightly with different versions of the ServerGuide program. To learn more about the version that you have, start the *ServerGuide Setup and Installation* CD and view the online overview. Not all features are supported on all blade server models.

The ServerGuide program requires a supported IBM blade server that is associated with an enabled startable (bootable) CD drive. In addition to the *ServerGuide Setup and Installation* CD, you must have the operating-system CD to install the operating system.

The ServerGuide program has the following features:

- Sets system date and time
- Detects installed optional hardware devices and provides updated device drivers for most adapters and devices
- Provides diskette-free installation for supported Windows operating systems
- Includes an online readme file with links to tips for the hardware and operating-system installation

Setup and configuration overview

Use this information to setup and configure the blade server.

When you use the *ServerGuide Setup and Installation* CD, you do not need setup diskettes. You can use the CD to configure any supported IBM blade server model. The setup program provides a list of tasks that are required to set up the blade server.

Note: Features and functions can vary slightly with different versions of the ServerGuide program.

When you start the *ServerGuide Setup and Installation* CD, the program prompts you to complete the following tasks:

- Select your language.
- Select your keyboard layout and country.
- View the overview to learn about ServerGuide features.
- View the readme file to review installation tips for your operating system and adapter.
- Start the operating-system installation. You will need your operating-system CD.

Typical operating-system installation

Use this information for a typical ServerGuide operating-system installation.

The ServerGuide program can reduce the time it takes to install an operating system. It provides the device drivers that are required for the hardware and for the operating system that you are installing. This section describes a typical ServerGuide operating-system installation.

Note: Features and functions can vary slightly with different versions of the ServerGuide program.

1. After you have completed the setup process, the operating-system installation program starts. (You will need your operating-system CD to complete the installation.)
2. The ServerGuide program stores information about the blade server model, service processor, hard disk drive controllers, and network adapters. Then, the program checks the CD for newer device drivers. This information is stored and then passed to the operating-system installation program.
3. The ServerGuide program presents operating-system partition options that are based on your operating-system selection and the installed hard disk drives.
4. The ServerGuide program prompts you to insert your operating-system CD and restart the blade server. At this point, the installation program for the operating system takes control to complete the installation. The BladeCenter CD drive must be associated with the blade server when this step is performed.

Installing the operating system without using ServerGuide

Use these instructions to install the operating system on the blade server without using a ServerGuide.

If you have already configured the blade server hardware and you are not using the ServerGuide program to install the operating system, complete the following steps to download the latest operating-system installation instructions from the IBM Web site.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/support/.
2. Under **Support type**, select **BladeCenter**.
3. Under **Popular links**, select **Operating system installation**.
4. Under **Choose the system you want instructions for**, click **BladeCenter HS22**.
5. From the **Installation** list, select your operating system to display the available installation documents.

Using the PXE boot agent utility program

Use these instruction to start the PXE boot agent utility program.

Use the Preboot Execution Environment (PXE) boot agent utility program to select the boot protocol and other boot options and to select a power-management option.

Notes:

1. The blade server does not support Remote Program Load (RPL) selection for the boot protocol option.
2. Enabling PXE might reduce the number of optional expansion modules that your blade server can manage.

To start the PXE boot agent utility program, complete the following steps:

1. Turn on the server (see "Turning on the blade server" on page 18).
2. When the `Broadcom NetXtreme Boot Agent vX.X.X` prompt is displayed, press Ctrl + S. You have 2 seconds (by default) to press Ctrl + S after the prompt is displayed.
3. Follow the instructions on the screen to change the settings of the selected items.

Firmware updates

Use this information to update the blade server to the latest levels of UEFI code and firmware updates.

IBM periodically makes UEFI code, service processor (IMM) firmware, and diagnostic firmware updates available for the blade server. Before you install the blade server in a BladeCenter unit, go to http://www.ibm.com/systems/support/ to download the latest firmware for the blade server. Install the updates, using the instructions that are included with the downloaded files.

Important: To avoid problems and to maintain system performance, always make sure that the UEFI code, service processor (IMM) firmware, and diagnostic firmware levels are consistent for all blade servers within the BladeCenter unit.

Configuring UEFI compatible devices

Use this information to configure UEFI compatible devices.

Your IBM BladeCenter HS22 Type 7870 and 1936 blade server is UEFI compatible. UEFI compatible expansion cards can be configured through the Setup utility. To configure a UEFI compatible expansion card, complete the following steps:

Note: Before configuring a UEFI compatible device, it is recommended to update the firmware for your blade server. See "Firmware updates" for information on how to update the firmware for your blade server.

1. Run the Setup utility (see "Using the Setup utility" on page 56).
2. Select **System Settings** → **Adapters and UEFI drivers**.
3. Select **Please refresh this page first** and press Enter.

4. Select the device driver that you want to configure and press Enter.
5. When you have finished changing settings, press Esc to exit from the program; select **Save** to save the settings that you have changed.

Configuring the Gigabit Ethernet controller

Use this information to locate the device drivers for the Gigabit Ethernet controller.

One dual-port Gigabit Ethernet controller is integrated on the blade server system board. The controller provides a 1000 Mbps full-duplex interface for connecting to one of the Ethernet-compatible I/O modules in I/O-module bays 1 and 2, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN). The Ethernet controller on the system board is routed to I/O-module bay 1 or bay 2. The logical link of each Ethernet port to an I/O-module bay is assigned by the operating system.

You do not have to set any jumpers or configure the controller for the blade server operating system. However, you must install a device driver to enable the blade server operating system to address the Ethernet controller. For device drivers and information about configuring the Ethernet controller, complete the following steps.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/support/.
2. Under **Select product or service type for support**, select **BladeCenter**.
3. Under **Popular links**, click **Software and device drivers**.
4. From the **IBM BladeCenter** menu, select **BladeCenter HS22**.
5. From the download categories, click the **Networking** category.
6. Find the device driver for your operating system; then, click on the version number to go to the download page for the device driver.

Configuring a RAID array

Use this information to configure a RAID array.

Configuring a RAID array applies only to a blade server in which two or more storage drives are installed.

Note: When configuring a RAID array, the storage drives must use the same type of interface. For example, a RAID array can be configured with two SAS storage drives, two SATA storage drives, or two SSD storage drives.

You can use two storage drives in the blade server to implement and manage RAID level-0 (striping) or RAID level-1 (mirror) arrays in operating systems that are listed on the ServerProven list at http://www.ibm.com/servers/eserver/serverproven/compat/us/. For the blade server, you must configure the RAID by using the LSI Configuration Utility program.

If an optional RAID expansion card is installed, you can use it to control all of the storage drives that are installed in the blade server. See the documentation that comes with the expansion card for information on how to configure the RAID array.

Important: You must create the RAID array *before* you install the operating system on the blade server.

You can use the LSI Logic Configuration Utility program to configure the storage drives and the SAS controller. To start the LSI Logic Configuration Utility, see "Using the LSI Logic Configuration Utility program."

Using the LSI Logic Configuration Utility program

Use these instructions to start the LSI Logic Configuration Utility program.

You can use the LSI Logic Configuration Utility program to perform the following tasks:

- Set the SAS device scan order
- Set the SAS ID for the controller
- Manage the SAS RAID configuration

To start the LSI Logic Configuration Utility program, complete the following steps:

Note: The LSI controller on your blade server is a UEFI compatible device and can also be configured through the Setup utility for your blade server (see "Configuring UEFI compatible devices" on page 62).

1. Turn on the blade server, and make sure that the blade server is the owner of the keyboard, video, and mouse.
2. When the `<<<Press Ctrl-C to start LSI Logic Configuration Utility>>>` prompt is displayed, press Ctrl+C.
3. Use the arrow keys to select the controller from the list of adapters; then, press Enter.
4. Follow the instructions on the screen to change the settings of the selected items; then, press Enter. If you select **SAS Topology** or **Advanced Adapter Properties**, additional screens are displayed.

Using LAN over USB to interface the IMM

Unlike the BMC, the IMM does not require IPMI device drivers or USB daemons for in-band IMM communication. Instead, a LAN over USB interface enables in-band communications to the IMM; the IMM hardware on the system board presents an internal Ethernet NIC from the IMM to the operating system. LAN over USB is also called the "USB in-band interface" in the IMM Web interface.

Typically, the IMM IP address for the LAN over USB interface is set to a static address of 169.254.95.118 with a subnet mask of 255.255.0.0. In the event of an IP address collision on the network, the IMM might obtain a different IP address in the 169.254.*xxx.xxx* range. The IMM first attempts to use the default static address, 169.254.95.118. If that IP address is already in use, the IMM attempts to randomly obtain an address until it finds one that is not in use.

Because the IMM might obtain a random IP address for the LAN over USB interface, the IBM Advanced Settings Utility (ASU) and firmware flash utilities, DSA, and the IBM Director Agent use the Service Location Protocol (SLP) to discover the IMM IP address. These tools perform an SLP multicast discovery on the LAN over USB interface. When they receive a response from the IMM, they obtain the attributes that contain the IP address the IMM is using for the LAN over USB interface.

Potential conflicts with the LAN over USB interface

In some situations, the IMM LAN over USB interface can conflict with certain network configurations, applications, or both.

In some situations, the IMM LAN over USB interface can conflict with certain network configurations, applications, or both. For example, Open MPI attempts to use all of the available network interfaces on a server. Open MPI detects the IMM LAN over USB interface and attempts to use it to communicate with other systems in a clustered environment. The LAN over USB interface is an internal interface, so this interface does not work for external communications with other systems in the cluster.

Resolving conflicts with the IMM LAN over USB interface

Use this information to resolve LAN over USB conflicts with network configurations and applications.

There are several actions that resolve LAN over USB conflicts with network configurations and applications:

1. For conflicts with Open MPI, configure the application so it does not attempt to use this interface.
2. Take the interface down (run `ifdown` under Linux).
3. Remove the driver (run `rmmod` under Linux).
4. Disable the USB in-band interface on the IMM through either the IMM Web interface or the AMM Web interface.

   Important: If you disable the USB in-band interface, you cannot perform an in-band update of the IMM firmware using the Linux or Windows flash utilities. If the USB in-band interface is disabled, use the Firmware Update option on the IMM Web interface to update the firmware.

   If you disable the USB in-band interface, also disable the watchdog timeouts to prevent the server from restarting unexpectedly.

   - Use the following steps to disable the LAN over USB interface from the IMM Web interface.
     a. Log in to the IMM on which you want to disable the USB device driver interface.
     b. In the navigation pane, click **System Settings** and scroll down to the **Miscellaneous** area.
     c. Select the **Do not allow commands on USB interface** check box to disable the USB in-band interface. Selecting this option does not affect the USB remote presence functions (for example, keyboard, mouse, and mass storage). When you disable the USB in-band interface, the in-band systems-management applications such as the Advanced Settings Utility (ASU) and firmware update package utilities might not work.

        Note: The ASU works with a disabled USB in-band interface if an IPMI device driver is installed.

        If you try to use systems-management applications while the in-band interface is disabled, they might not work.
     d. Click **Save**.
   - Use the following steps to disable the LAN over USB interface from the Advanced Management Module (AMM) Web interface:

a. Log in to the AMM Web interface.
b. In the navigation pane, click **Blade Configuration** under the **Blade Tasks** heading.
c. Scroll down to the Service Processor LAN over USB interface are on the Blade Configuration web page. The section lists all blades in the chassis which are capable of enabling and disabling the LAN over USB interface.
d. Select the check boxes next to the blade or blades that you want to enable or disable.
e. Click the **Disable** button to disable the LAN over USB interface on the selected blades.

Configuring the LAN over USB interface manually

The IMM using the LAN over USB interface requires operating-system drivers and other configuration. The firmware update package or Advanced Settings Utility attempt to perform the setup automatically, if needed. If the automatic setup fails or if you prefer to set up the LAN over USB manually, use one of the following processes. For more information about LAN over USB configuration on different operating systems, see the IBM white paper *Transitioning to UEFI and IMM* on the IBM web site (see "Related documentation" on page 3 for information on how to find publications for your blade server).

Windows IPMI device driver

Use this information to install the Microsoft IPMI device driver.

The Microsoft IPMI device driver is not installed by default on Microsoft Windows Server 2003 R2 operating systems. To install the Microsoft IPMI device driver, complete the following steps:

1. From the Windows desktop, click **Start** → **Control Panel**→ **Add or Remove Programs**.
2. Click **Add/Remove Windows Components**.
3. From the component list, select **Management and Monitoring Tools**, and then click **Details**.
4. Select **Hardware Management**.
5. Click **Next**. The installation wizard opens and guides you through the installation.

   Note: The Windows installation disk might be required.

LAN over USB Windows Driver Installation

Use this information to install the LAN over USB driver for Windows.

When you install Windows, there will be an unknown RNDIS device in the device manager. IBM provides a Windows INF file that identifies this device. The signed version of the INF is included in all of the Windows versions of the IMM, UEFI, and DSA update packages. Perform the following steps to install `ibm_rndis_server_os.inf`.

Note: These steps only need to be performed if the server is running a Windows operating system and the `ibm_rndis_server_os.inf` file has not been previously installed. The file needs to be installed only once. It is required by Windows operating systems to detect and use the LAN over USB functionality.

1. Obtain a Windows version of the IMM, server firmware, and DSA update package (see “Firmware updates” on page 62 for more information).
2. Extract the `ibm_rndis_server_os.inf` and `device.cat` files from the firmware update package and copy them to the `\WINDOWS\inf` subdirectory.
3. For Windows 2003: Install the `ibm_rndis_server_os.inf` file by right-clicking on the file and selecting **Install**. This generates a PNF file of the same name in `\WINDOWS\inf`.

   For Windows 2008: Go to **Computer Management**, then **Device Manager** and find the RNDIS Device. Select **Properties > Driver > Reinstall driver**. Point the server to the `\Windows\inf` directory where it can find the `ibm_rndis_server_os.inf` file and install the device.
4. Go to **Computer Management** then **Device Manager** and right-click on **Network adapters** and select **Scan for hardware changes**. A small pop-up confirms that the Ethernet device is found and installed. The New Hardware Wizard starts automatically.
5. When you are prompted with the question, “Can Windows connect to Windows Update to search for software?", select **No, not this time**. Click **Next** to continue.
6. When you are prompted with the question, "What do you want the wizard to do?", select **Install from a list or specific location (Advanced)**. Click **Next** to continue.
7. When you are prompted with the statement, "Please choose your search and installation options", select **Don't search. I will choose the driver to install**. Click **Next** to continue.
8. When you are prompted with the statement, "Select a hardware type, and then click Next", select **Network adapters**. Click **Next** to continue.
9. You are prompted with the statement, "Completing the Found New Hardware Wizard". Click **Finish**.

   Note: A new local area connection appears and might state, "This connection has limited or no connectivity". Ignore this message.
10. Go back to the Device Manager. **IBM USB Remote NDIS Network Device** appears under **Network Adapters**.
11. Open a command prompt, type `ipconfig`, and press Enter. The local area connection for the IBM USB RNDIS appears with an IP address in the range of 169.254.*xxx.xxx* with a subnet mask set to 255.255.0.0.

LAN over USB Linux Driver Installation

Use this information to install the LAN over USB driver for Linux.

Current versions of Linux, such as RHEL5 Update 2 and SLES10 Service Pack 2, support the LAN over USB interface by default. This interface is detected and displayed during the installation of these operating systems. When you configure the device, use a static IP address of 169.254.95.130 with a subnet mask of 255.255.0.0.

Note: Older Linux distributions might not detect the LAN over USB interface, and might require manual configuration. For information about configuring LAN over USB on specific Linux distributions, see the IBM white paper *Transitioning to UEFI and IMM* on the IBM web site (see “Related documentation” on page 3 for information on how to find publications for your blade server).

The IMM LAN over USB interface requires that the `usbnet` and `cdc_ether` drivers be loaded. If the drivers have not been installed, use `modprobe` to install them. When these drivers are loaded, the IMM USB network interface shows up as a network device in the operating system. To discover the name that the operating system has assigned to the IMM USB network interface, type:

```
dmesg | grep -i cdc ether
```

The interface is configured with `ifconfig` to have an IP address in the range 169.254.*xxx.xxx*. For example:

```
ifconfig IMM_device_name 169.254.1.102 netmask 255.255.0.0
```

This interface is configured to come up with an IP address in the 169.254.*xxx.xxx* range each time that the operating system is booted.

Chapter 5. Installing the operating system

Use these instructions to install the operating system on the blade server.

To install the operating system on a blade server, you can use any of the following methods:

- Use the *ServerGuide Setup and Installation* CD to install a supported Microsoft Windows operating system.
- Use Remote Deployment Manager (RDM) Version 4.20 (or later) to install a supported operating system. To determine whether RDM supports an operating system, see http://www.ibm.com/systems/management/.
- Download the latest operating-system installation instructions and install the operating system.

Important: The operating system in the blade server must provide USB support for the blade server to recognize and use the keyboard, mouse, and removable-media drives. The BladeCenter unit uses USB for internal communication with these devices.

Using the ServerGuide Setup and Installation CD to install the operating system

Use these instructions for using the ServerGuide Setup and Installation CD to install the blade server operating system.

To use the *ServerGuide Setup and Installation* CD, complete the following steps:

1. While the blade server is on, press the KVM select button on the front of the blade server to associate the BladeCenter unit CD drive with the blade server.
2. Insert the CD, and restart the blade server. If the CD does not start, see "ServerGuide problems" on page 72.
3. Follow the instructions on the screen to complete the following tasks:
   a. Select your language.
   b. Select your keyboard layout and country.
   c. View the overview to learn about ServerGuide features.
   d. View the readme file to review installation tips about your operating system and adapter.
   e. Start the setup and hardware configuration programs.
   f. Start the operating-system installation. You will need your operating-system CD.

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Using RDM to install the operating system

Use this information if you are using RDM to install the blade server operating system.

You can use RDM to install a supported operating system on a blade server.

Follow the instructions in the documentation that comes with RDM to install a supported operating system.

Note: To determine whether an RDM supports an operating system, see http://www.ibm.com/systems/management/.

Downloading installation instructions

Use these instructions to download the operating-system installation instructions.

To download operating-system installation instructions, complete the following steps.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Select product or service type for support**, click **BladeCenter**.
3. Under **Popular Links**, click **Operating system installation**.
4. Under **Choose the system you want instructions for**, click **BladeCenter HS22**.
5. Under the **Installation**, select the operating system you want to install.

Chapter 6. Solving problems

Use these instructions to resolve any problems you may encounter while installing the blade server.

If you install the blade server in the BladeCenter unit and the blade server does not start, perform the following actions:

- Make sure that the BladeCenter unit is correctly connected to a power source.
- Reseat the blade server in the BladeCenter unit (see "Installing the blade server in a BladeCenter unit" on page 51).
- If the power-on LED is flashing slowly, turn on the blade server (see "Turning on the blade server" on page 18).
- If you have just added a new optional device or component, make sure that it is correctly installed and compatible with the blade server and its components. If the device or component is not compatible, remove it from the blade server, reinstall the blade server in the BladeCenter unit, and then restart the blade server.

If the blade server does not start after you have performed the preceding actions, see the *Problem Determination and Service Guide* for your blade server on the IBM *Documentation* CD.

Diagnostic tools overview

Use this overview to locate specific diagnostic tools to diagnose and solve hardware-related problems.

The following tools are available to help you diagnose and solve hardware-related problems:

- **POST codes, error messages, and error logs**

  The POST error codes indicate the detection of a problem. See the *Problem Determination and Service Guide* for more information.
- **Troubleshooting tables**

  These tables list problem symptoms and actions to correct the problems. See the *Problem Determination and Service Guide* for your blade server.
- **Light path diagnostics**

  Use light path diagnostics LEDs on the system board to diagnose system errors. If the system-error LED on the system LED panel on the front or rear of the BladeCenter unit is lit, one or more error LEDs on the BladeCenter unit components also might be lit. These LEDs help identify the cause of the problem. Blade server error LEDs are described in the *Problem Determination and Service Guide* for your blade server.
- **Dynamic System Analysis (DSA) Installable and Portable Edition diagnostic program**

  DSA tests the major components of the BladeCenter unit, including the management modules, I/O modules, removable-media drives, and the blade servers, while the operating system is running. DSA can be plugged into an existing IBM Director environment or installed without IBM Director present. For documentation and download information for DSA, see

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http://www.ibm.com/systems/management/. For more information about diagnostic programs and error messages, see the *Problem Determination and Service Guide* for your blade server.

Note: If you are unable to find the system-error logs in the blade server firmware code, view the system-event log in the BladeCenter management module.

- **Dynamic System Analysis (DSA) Preboot diagnostic program**

  The DSA Preboot diagnostic programs are stored in read-only memory and collect and analyze system information to aid in diagnosing server problems. The diagnostic programs collect the following information about the server:

  – Drive health information
  – Event logs for ServeRAID controllers and service processors
  – Hardware inventory, including PCI and USB information
  – Light path diagnostics status
  – LSI RAID and controller configuration
  – Network interfaces and settings
  – ServeRAID configuration
  – Service processor status and configuration
  – System configuration
  – Vital product data, firmware, and Unified Extensible Firmware Interface (UEFI) configuration

  The diagnostic programs create a merged log that includes events from all collected logs. The information is collected into a file that you can send to IBM service and support. Additionally, you can view the information locally through a generated text report file. You can also copy the log to removable media and view the log from a Web browser.

ServerGuide problems

Use this information to locate ServerGuide problems and suggested actions.

The following table lists problem symptoms and suggested solutions.

Symptom	Suggested action
The *ServerGuide Setup and Installation* CD will not start.	• Make sure that the CD drive is associated with the blade server that you are configuring. • Make sure that the blade server supports the ServerGuide program and has a bootable CD (or DVD) drive. • If the startup (boot) sequence settings have been changed, make sure that the CD drive is first in the startup sequence.
The RAID configuration program cannot view all installed drives, or the operating system cannot be installed.	• Make sure that there are no duplicate SCSI/SAS IDs or interrupt request (IRQ) assignments. See “Configuring a RAID array” on page 63. • Make sure that the storage drive is connected correctly. See “Blade server connectors” on page 19 to locate the storage drive connector.
The operating-system installation program continuously loops.	Make more space available on the hard disk.

Symptom	Suggested action
The ServerGuide program will not start the operating-system CD.	Make sure that the operating-system CD is supported by the ServerGuide program. See the *ServerGuide Setup and Installation* CD label for a list of supported operating-system versions.
The operating system cannot be installed; the option is not available.	Make sure that the operating system is supported on the blade server. If the operating system is supported, either no logical drive is defined (SCSI/SAS RAID systems) or the ServerGuide System Partition is not present. Run the ServerGuide program and make sure that setup is complete.

Appendix. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you.

Use this information to obtain additional information about IBM and IBM products, determine what to do if you experience a problem with your IBM system or optional device, and determine whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself.

If you believe that you require IBM to perform warranty service on your IBM product, the IBM service technicians will be able to assist you more efficiently if you prepare before you call.

- Check for updated firmware and operating-system device drivers for your IBM product. The IBM Warranty terms and conditions state that you, the owner of the IBM product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your IBM service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.

  You can obtain the latest downloads for your IBM product from http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=MIGR-63017 .
- If you have installed new hardware or software in your environment, check http://www.ibm.com/servers/eserver/serverproven/compat/us/eserver.html to make sure that the hardware and software is supported by your IBM product.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your IBM product. Information about diagnostic tools is in the *Problem Determination and Service Guide* on the IBM *Documentation* CD that comes with your product.
- Go to http://www.ibm.com/systems/support/ to check for information to help you solve the problem.
- Gather the following information to provide to IBM service. This data will help IBM service quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.
  - Hardware and Software Maintenance agreement contract numbers, if applicable
  - Machine type number (IBM 4-digit machine identifier)
  - Model number
  - Serial number
  - Current system UEFI (or BIOS) and firmware levels
  - Other pertinent information such as error messages and logs
- Go to http://www.ibm.com/support/electronic/portal/ to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process

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of determining a solution to your problem by making the pertinent information available to IBM service quickly and efficiently. IBM service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files.

See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/systems/support/.

You can find the most up-to-date information for BladeCenter products at http://publib.boulder.ibm.com/infocenter/bladectr/documentation/index.jsp.

Getting help and information from the World Wide Web

On the World Wide Web, up-to-date information about IBM systems, optional devices, services, and support is available at http://www.ibm.com/systems/support/.

You can find the most up-to-date product information for BladeCenter products at http://publib.boulder.ibm.com/infocenter/bladectr/documentation/index.jsp.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with your IBM products.

For information about which products are supported by Support Line in your country or region, see http://publib.boulder.ibm.com/infocenter/bladectr/documentation/index.jsp.

For more information about Support Line and other IBM services, see http://www.ibm.com/services/us/index.wss or see http://www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

You can receive hardware service through your IBM reseller or IBM Services.

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Table 9. Limits for particulates and gases

Contaminant	Limits
Particulate	• The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.21. • Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282. • The deliquescent relative humidity of the particulate contamination must be more than 60%2. • The room must be free of conductive contamination such as zinc whiskers.
Gaseous	• Copper: Class G1 as per ANSI/ISA 71.04-19853 • Silver: Corrosion rate of less than 300 Å in 30 days

Table 9. Limits for particulates and gases (continued)

Contaminant	Limits
1 ASHRAE 52.2-2008 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. 2 The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction. 3 ANSI/ISA-71.04-1985. Environmental conditions for process measurement and control systems: Airborne contaminants. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.	

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Avis de conformité à la réglementation d'Industrie Canada

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Responsible manufacturer:

International Business Machines Corp.
New Orchard Road
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914-499-1900

European Community contact:

IBM Technical Regulations, Department M456
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Part Number: 81Y1104

Printed in USA

(1P) P/N: 81Y1104